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Communications relating to membership and matters pertaining to the American Veterinary Medical Association should be addressed to Acting Secretary L. Enos Day, 1827 S. Wabash Ave., Chicago, Ill. Matters pertaining to the Journal should be sent to Ithaca, N. Y.

CENTRALIZATION

The lack of centralized authority has been responsible for serious delay in certain branches. A system with division of authority means a consequent and deleterious division of responsibility. There is perhaps an undemocratic flavor to the idea of concentrating authority but it has the advantage of locating the responsibility promptly and speeding results.

The recent history of the railroad transportation is an apt illustration. The highly trained specialists of the railroad world who gave their services to the government accomplished more marvels than American railroads had ever accomplished before. In spite of all their efforts their work failed when the emergency arose because they were lacking in coordination. There was a lack in perspective, an inability to utilize all of the railroads as a single system. The lack of centralized authority was seen and admitted by the railroad men themselves and this authority was their solution of the problem. Since the Secretary of the Treasury has assumed the directorship of the railways there has been improvement. The arrangement has been bad for some of the roads, but it has improved transportation.

The airplane industry has not met expectations and centralized authority is demanded for this branch of the service. The allied armies have fought more or less independently for three years or over. There has been evidence of lack of coordination. There has doubtless been pride in the size and organization of a great national army and an unreadiness to place it under the supreme command of a General of another nationality. In opposition there has been an enemy highly organized and with authority very much centralized. The enemy, more favorably situated as to geographical position, has been able to swing armies from one front to another with the hope of conquering its opponents singly. The fighting has now centered upon the western front; the supreme test has begun and in the emergency the authority has been centralized in General Foch as Generalissimo. America is second to none in her pride and support of her Army—much of it still in the making. By brigading her troops with the gallant French and British defenders of civilization, she has waived selfish ambition of a great national army as a separate entity, when for the common good greater effectiveness may result. There has, throughout the war, been unity of purpose. With more complete unity of action, there is more promise of success.

If centralization of authority is desirable or essential in carrying out great projects in the Service, it follows that it is applicable as well to subordinate branches, each in its sphere. The veterinary corps has not been overburdened with authority. Its past history is over, but in its reorganization and future plans, centralization of authority is the goal to keep in mind. Healthy, normal soldiers belong to their commanding general; when sick, wounded and disabled they belong to the Surgeon General. Each is supreme in his own department. The Army animals belong to the Quartermaster's department; when sick or disabled they should belong to the veterinary department and veterinarians should have full authority over them until they are again fit for service. Our veterinary war history is in the making. It is wise to utilize the best features of veterinary service as shown in other armies and profit by the experience of others. Authority locates responsibility. Efficiency is the standard of success. This standard may make or break leaders but it must be maintained. An open page lies before our veterinary corps. The history written thereon will determine

its future. We venture the prediction, when all is said and done, that it will compare favorably with that of others.

P. A. F.

GRADING COLLEGES

Although several months intervene before the Philadelphia meeting, it seems to the writer that there are a few problems that might well be considered and perhaps discussed in our JOURNAL prior to the August meeting.

The first problem in mind is the college situation. While the writer has never taken the college problem as seriously to heart as some of our members, believing, as he does, that such matters with a little assistance will eventually adjust themselves; at the same time it is fully realized that we have reached a point which is daily becoming more acute, where the veterinary colleges of North America, both State and private, must be so classified that prospective students who desire to take up the study of veterinary science will have some sort of a guide to aid them in choosing the particular institution from which to obtain instruction. Under existing conditions the prospective student has no means of definitely ascertaining which are accredited institutions and which are not. He usually applies to the most available college irrespective of its standing only to find when it is perhaps too late and to his sorrow that his chosen *alma mater* has a questionable standing, if any, with the profession he is entering.

Young men have come to the writer after graduation from unrecognized colleges seeking to obtain membership in the American Veterinary Medical Association and other recognition and have stated that they entered such institutions without knowledge and with no means of obtaining information which would in any way enlighten them as to their character and standing. They naturally assumed that as long as such colleges were operating under government sanction by state charter that everything was as it should be.

It is quite obvious that there can be no greater handicap for the recent graduate than to discover when he goes out into the world to follow his chosen profession that his credentials for which he labored so hard are not recognized by the existing authorities

on veterinary education, the American Veterinary Medical Association and the United States Bureau of Animal Industry.

That there is an element of injustice in all this, that should be remedied if possible, goes without saying. The big problem confronting us is to determine wherein lies the remedy. Having in mind that suggestions might be asked for from men who are interested in this problem through the medium of our JOURNAL is what prompted the idea to broach the subject at this time.

In order to start the ball rolling in this direction the following suggestion is offered: that all colleges on this continent be scored by the committee on intelligence and education of the A. V. M. A. and depending upon the score obtained each college be placed in class A, B, or C, depending upon their facilities and qualifications to give instruction.

This plan has been and is being followed out by the Association of American Medical Colleges and that it has been successful is attested by the fact that the Surgeon General has decreed that only medical men who are graduates of class A or B colleges, as classified by the Association of American Medical Colleges, can obtain entry into the United States Service. Graduates of class C colleges cannot enter the medical corps as officers and boards of examiners of many states will not permit them to take state board examinations for entrance into private practice.

Let us adopt then as soon as may be practical some system of classifying our veterinary educational institutions which will at least be definite and mean something to the prospective student.

R. A. A.

EUROPEAN CHRONICLES

Bois Jerome.

RABIES IN GUINEA PIGS.—Probably this heading will be a surprise to some of our readers, who may ask what interest rabies of guinea pigs will offer. My excuse is the interest the subject may present from the point of view of comparative pathology and the value to those who experiment on the disease with these little animals. At any rate this contribution to the study of rabies in guinea pigs is in the *Annales de l'Institut Pasteur* and is signed by Prof. P. Remlinger, which is sufficient to indicate that the subject

is interesting. It is to be regretted that its length does not allow an entire translation. I will give only extracts from it.

The clinical physionomy of rabies in guinea pigs is far from uniform. In the animal inoculated with street virus the furious form is most frequently observed. All the intermediate forms exist from the most violent to the most attenuated. After this statement, Doctor Remlinger gives a description of the various forms observed. First the furious form, then a more attenuated, the dyspneic, the pseudo-septicemic, the spasmodic, those in which the disease assumes such severity that like a shock death occurs generally between 24 and 36 hours or even in a shorter time, and before it has been possible to ascertain and fix the form of rabies that caused it. There are also the paralytic forms among which is that caused exclusively by fixed virus.

In a second portion of his article, the author presents a very interesting examination of the many factors that are liable to modify, in guinea pigs, the symptomatology of rabies and also its duration and progressive advance.

Among the principal factors is first considered the influence of the number of passages of the virus for the study of which, experiments were carried out with three viruses, in the second is the influence of the mode of inoculation and in the third that of the seat of inoculation and finally that of other foreign factors.

Following this important demonstration, the importance of which is principally from the point of view of experimentation, a minute comparison is made of the disease in guinea pigs and rabbits, and finally the article closes with the following résumé and conclusions:

"In opposition to rabies with fixed virus—always of a paralytic type—rabies with street virus has, in guinea pigs a most varied physionomy. The furious form is the most frequently observed, but all the intermediate forms exist. At times there is no agitation, the dominating symptom is dyspnea and the symptomatology is such that it resembles one of the numerous epizootic pulmonary affections of guinea pigs. The dyspnea may of itself be little marked and the analogy is then more like that of septicemia than a broncho-pneumonia.

"The spasmodic form, which is particularly observed after inoculation in the anterior chamber and nasal instillations, is very special. It is essentially characterized by a violent reaction, both

objective and subjective, (prurit) at the point of inoculation, by pharyngeal rhonchus, spasms and convulsions. It has a great analogy with the form of rabies most common in man.

"The duration of declared rabies may, in guinea pigs, be very short. While the preceding forms, which run their course ordinarily in 24 to 48 hours, there is a form lightning like (foudroyante), the duration of which is so short that the disease escapes observation and death seems to occur suddenly. Hence in experiments on rabies, all pigs that die without symptoms can be considered as suspicious. Corpuscles of Negri should be looked for and the bulb be used for passage.

"The paralytic type is manifested under two forms, the relaxed and that with contracture or pseudo-tetani. Both may assume an ascending progress in their development and attain the syndrome of Landry, so frequent during rapid manifestations.

"A certain number of factors are likely to exercise influence upon the symptomatology of the disease. In passing from guinea pig to guinea pig, street virus becomes more active than from rabbit to rabbit. It may happen that after 8 or 10 passages, it kills in a fixed manner in 5 to 7 days. The first inoculations, starting from the dog, may give a paralytic form. After 2 to 4 passages the furious form, in its most severe aspect, may be observed. The severity of the symptoms diminishes afterwards. There are dyspnea, pseudo-septicemia forms, which towards the 20th passage, give rise to a paralytic form, which lasts to the end.

"The mode of inoculation, in the case of intramuscular or subcutaneous injections, the seat of inoculation, the age of the animal, the dose of injected virus, etc., have also their effect on the symptoms presented. If with the intracranial and intraocular injections, all the forms of rabies may be noticed, those in the muscles of the thigh or the soles of the feet give almost exclusively the pseudo-tetanic form. The analogy with tetanus is completed by the fact that in case of subcutaneous or intramuscular inoculations, paralysis almost always began at the inoculated region.

"Paralytic rabies is observed, especially in the street virus, in young animals and with a large dose of virus; while in adult age and with weak doses furious rabies prevails. In the experimental rabies of guinea pigs there is no splanchnic type comparable to the splanchnic type of tetanus.

"Guinea pigs are sensibly more susceptible to rabid virus

than rabbits. The period of inoculation is shorter and a smaller dose of virus or attenuated virus, harmless for the rabbit, causes the disease. There is then a great advantage which counterbalances in part the shortness of the disease and the variability of the clinical type. This must not be ignored in investigating rabies.''

SYNCHISIS SCINTILLANS IN HORSES.—Well known in man, this affection of the eye is almost entirely unknown in our domestic animals, except for two cases that have been clinically observed in Berlin, one in a horse, the other in a pigeon.

Veterinary Major Brock-Rousseau has observed one case lately and recorded it in the *Revue de Pathologie Comparée.*

It was in an aged gray mare. Both eyes had the aspect of a glass paper weight in which a quantity of small glittering bodies are fixed in the paste. The aqueous humor was filled with similar bodies, constantly in motion, and having the appearance of containing a quantity of golden dust in the cavities of the eye. Both organs of sight were alike and nothing else appeared which could explain such a condition.

As the affection has not been described in veterinary literature, says the writer, few facts are related by him.

It is said that about 1828 the discovery of scintillans synchisis was made by a physician, Doctor Parfait Davidson. In 1849 a German oculist noticed in sections made on several eyes, that cholesterin was present and that there had been preceding choroiditis. In 1876, besides the cholesterin, two new forms of crystals were discovered in eyes where the condition of scintillans had been observed, these were tyrosin and some phosphatic salts. In 1890 the anatomical changes were attributed by Gallannaerts to the choroid only—and finally Panas in feeding rabbits with naphthalin obtained an experimental scintillans synchisis, composed of crystals of sulfate and carbonate of lime without traces of cholesterin.

With this history we are brought to the definition of today, viz.: a rare form of softening of the vitreous humor, characterized by the presence of numerous (paillettes) broken crystals of cholesterin, floating in the interior and glittering as flakes of gold.

Examination with the ophthalmoscope is peculiar. When it is made with lenses of 18 or 20 dioptrics, if one gradually takes away the lens so as to bring it to the point of the various layers of the

eye, he sees, after dilatation of the pupil, moving flecks of tyrosin recognized by their brilliant color and agglomerated masses of cholesterin with, sometimes, phosphatic agglomerations in the form of little balls covered with many dots. All these crystals may sometimes be observed by the naked eye and when they move they appear like gold dust. After dilatation of the pupil the vitreous humor has a very peculiar aspect, that of a brilliant kaleidoscope. With such conditions the sight is of course greatly impaired and often completely lost. There are cases where it remains almost normal and it is only accidentally that the oculist with the ophthalmoscope discovers the true condition of the eye.

The pathology of the disease is yet the subject of discussion and its etiology is in doubt. Old age, sex, some dyscrasia, syphilis, hepatic diseases seem to favor the genesis of the affection. In veterinary medicine all of these have only a secondary interest.

⚑ ⚑ ⚑

Goiter in Horses.—The pathology of the thyroid adenoma or goiter of horses is one which the previous articles of Prof. G. Petit of Alfort to which I have alluded in previous chronicles and to which I made reference under the title of epithelial tumors of the thyroid gland, has been the subject of another communication of valuable interest in the *Recueil* of Alfort.

Recalling the classification of the epithelial tumors, which he presented and which he divided into benignant (adenomas or goiters) and which can exceptionally be transformed into cancers, and the malignants, cancers proper or epitheliomas of various kinds. Prof. Petit, having treated of the latter in previous articles, says that he will complete the consideration of the subject by discussing now the pathology and evolution of the thyroidian adenoma or goiter, which, being synonymous in man, cannot be different in comparative pathology.

It will be understood that the study has for its object the sporadic, sometimes large and well characterized but more frequently encapsulated, invisible and not the endemic goiter which is so frequent in man at some climacteric, and has not been observed in equines.

In relation to the etiology, Petit says it is quite difficult to solve the question as like cancer, which at times follow it, both of these tumors result from the epithelial proliferation, independent of any characterized inflammation.

With the study of the pathogenesis various points are established.

For a long time it has been believed that goiter was due to the proliferation of the cells which line the thyroidian vesicles. This was an error, as the adenoma comes from the multiplication of the epithelial vesicles which remain between the vesicles and exist at the embryonic stage. Plates showing this condition of the thyroid in the embryo are shown. It is probable that the adenoma is the manifestation or process of a glandular renovation. Adenomatous cells have no pigment, a fact which contributes to the whitish aspect of the small adenomas.

The growth of the adenoma takes place by a characteristic and well defined nodular arrangement, or by extension or diffused infiltration with indefinite areas. These two processes are illustrated by excellent plates.

In the massive or trabecular adenoma the tendency to neovesiculation is not indicated. For the cystic and the pseudo-cystic transformation the process is also different. In these the neovesicles are small microscopic cysts, which have a tendency to enlarge and mingle so as to form cavities more or less irregular and wide.

Although the thyroidian adenoma represents a precancerous condition it does not necessarily follow that it must degenerate as such; yet cancer may be said to make its appearance more often in a gland having undergone the adenomatous transformation than in a normal gland.

The article of Prof. Petit closes with a schematic table of the three types of thyroidian adenomas with their cystic and pseudo-cystic form, viz.: the fundamental or initial, the diffused and their derivatives.

Cartilaginous Quittor.—I am writing upon this subject as Professor Sendrail, Veterinary Major, gives a good article in Panisset's *Revue* in relation to the operation.

After a long critique of nearly all that has been written on it, with familiar objections on some of the methods of operation and a fair acknowledgement of the advantages the Professor gives a description of modifications that have withstood the test of a long and wide experience.

These modifications consist, above all, in limiting the parietal injury to the wall so as to retain for the foot a normal resistance and preserve its integral function.

Before the operation the foot is prepared by a normal paring and the application of an ordinary shoe. This is done standing.

The wall is thinned following a half circle extending 6 to 8 centimeters in length and 4 in height with its anterior boundary quite far from the extremity of the cartilage and posteriorly about two centimeters from the heel. This thinning occupies nearly half the height of the quarter and must be made very thin immediately below the coronary band.

The cartilage is exposed by a straight incision along the inferior border of the coronary band, joining both ends of the incision and embracing a piece of the podophyllous tissue about one centimeter wide. The external face of the cartilage is isolated from the skin with a double sage knife introduced under the coronary band and moved forward and backward as in the classical method. With a curette knife of Volkmann the ablation of the cartilage is made quite easily.

The ablation of the anterior portion of the cartilage is the delicate step of the operation and demands careful use of the instrument.

The lateral ligament of the joint can then be saved from injury. The operation is complicated only in cases of ossified cartilage. Although the necrosed portion of the cartilage may sometimes appear as the only diseased structure, Sendrail recommends the ablation of the entire cartilaginous plate.

An ordinary dressing, moderately compressed, is applied and held in place by rolling bands and is renewed according to indications.

The results obtained by this mode of operation in several hundred cases have proved very satisfactory but they nevertheless required from four to six weeks of rest.

A New Veterinary Medical Association.—If the report from a professional journal from America is correct and "more than 800 veterinarians have already been assigned to duty in the American Army" and probably a number of them will come to France, the news published in the veterinary papers of England will prove of interest to them.

Visiting and joining a veterinary association in time of war at the center of hostilities and mingling with confréres of similar aims and speaking the same language, will no doubt prove a great

boon for our American confréres and present an opportunity they will accept with great pleasure.

I have already communicated with Professor F. Hobday, Veterinary Major, who is one of the officers of the association, and I hope to be able soon to give our American friends his reply to my inquiries if application for membership would be favorably entertained by the "Somme Veterinary Association" directors.

From the *Veterinary Journal* of England the following is given as notice of the organization:

At the suggestion that a Veterinary Medical Association be started at a centre "somewhere in France", as likely to be beneficial to the veterinary officers stationed in the neighborhood; the outcome was that the society should be called the "Somme Veterinary Medical Association"; that meetings should be held each fortnight, and a regular board of officers appointed and qualifications for membership adopted.

When the reply to my inquiries from Vice President Veterinary Major Hobday is at hand, I will communicate it to our friends in America.

Summary from Recent Publications Received and Bibliographic Notes.

Those marked "X" will be summarized. Those marked "O" will appear in abstracts.

Veterinary Review of Edinburg. The first number of volume two has been published lately. It is a fine issue of 138 pages and like its predecessors presents to its readers concise abstracts, reports, reviews, notes on books, and bibliography of great value. There is in the number a review by Doctor Wm. Osler of Oxford University, a well known scientist, who wrote for the *Veterinary Review* on the *Essai de Bibliographie Hippique* which is published in Paris, and again on the *Birth of Modern Surgery*, a valuable addition to the subject, in which the great work of Lister in surgery is fully considered and credited. Among the reviews of this number, our friends in America will be pleased to read of the works of Professor Williams on Obstetrics, Doctor DeVine on Bovine Tuberculosis, and Kilbourn on the Pasteurization of Milk.

(X) Maladies du Porc (Diseases of Swine) by Prof. Moussu (Asselin and Houzeau, Paris). This text will facilitate the work of the veterinary practitioner and the breeder. It will receive consideration later.

Journal of Comparative Pathology and Therapeutics. Early history of veterinary literature (continued)—Bracken poisoning in cattle—Treat-

ment of red water by intravenous injections of tartar emetic—(X) Contagious abortion in mares and joint ill in foals—Etiology and serum treatment.

VETERINARY JOURNAL, January, 1918. Distomatosis—Liver rot and flukes in sheep and cattle—Diphtheric vaginitis of cattle—(O) Delayed fracture of the humerus—(O) Radial paralysis in cows—(O) Adenoma of the alopecia—A note on jhooling in camels.

February. Report on Ixodic lymphangitis—(O) Adenoma of the kidneys—Bacterial pyelonephritis in a cow—Aspergillus in birds, man and cow—(O) An experience.

VETERINARY RECORD. Uterine torsion in cows, mares and cats—Malignant edema—Tetanus—Bloody urine—Morphine in dog practice—(X) Filariasis of the withers in horses.

VETERINARY NEWS. Bloody urine—(O) Interesting cases.

IL NUOVO ERCOLANI. On the naso-fronto-maxillary resection in dogs.

LA CLINICA VETERINARIA. Bacteriologic researches on the typhoid affections of horses—On the value of the method of Wullfi in the diagnosis of anthrax—(O) A case of puerperal mania—Tincture of iodine in the treatment of wounds.

REVUE DE PATHOLOGIE COMPARÉE. Epizootic abortion of bovines.

REVUE GENERAL DE MEDECINE VETERINAIRE. Life and work of A. Chauveau—Treatment of lymphangitis in horses—(O) Old fistula treated by polyvalent serum.

A. L.

—KILLING HORSES. A new equipment for killing condemned horses with illuminating gas has been installed in the Denver city pound. A small air-tight stall is connected with the city gas main. While the horse is munching his oats or hay from a manger in one side of the stall the gas enters from a pipe directly underneath. The animal gently and peacefully subsides into insensibility.—*The Popular Science Monthly.*

—A force of federal inspectors engaged upon the eradication of dourine, with headquarters at Albuquerque, New Mexico, have been assigned as follows: Drs. Joseph L. Flanigan, Vernon A. Dennis, Ben H. Steigleder, Guy E. Abrams, John J. Staab and Gardiner B. Jones.

—According to an order issued by the Secretary of Agriculture, the Federal quarantine against sheep scabies was lifted on April 15, 1918, from 136 counties in Texas with an area of 118,033 square miles. This order is deemed to be of special interest at this time because of the demand for mutton and wool.

STUDIES IN FORAGE POISONING*

ROBERT GRAHAM, A. L. BRUECKNER and R. L. PONTIUS
Laboratory of Animal Pathology, Kentucky Agricultural Experiment Station
Lexington, Ky.

The sporadic appearance of forage poisoning in Kentucky has afforded opportunity to project a series of experimental studies upon feeds which were proved to contain the causative factor of the disease. Numerous suspected feeds in sporadic outbreaks of forage poisoning have been fed to experimental horses with negative results; in fact, difficulty has been experienced in establishing the feed responsible for the disease in certain outbreaks which have come to our attention. Attempts to isolate the causative factor from positive feeds (feeds which in ingestion experiments produced the disease) have in many instances resulted negatively.

During the course of experimental studies veterinary practitioners and stockmen of wide experience have been consulted and the prevailing impression regarding the etiology of forage poisoning seemed to associate this disease with moldy or inferior feedstuffs. In one instance positive feed was not visibly contaminated with molds, and certain molds isolated from supposedly poisonous feeds after being propagated in the laboratory were supplied to animals in feeding experiments with negative results.

The possibility of more than one cause of forage poisoning, or that a clinical disease resembling forage poisoning may be induced by more than one etiologic agent, is not disregarded nor is it claimed that the type of forage poisoning observed in Kentucky is necessarily the same intoxication occurring sporadically in the various states. Experimental data available at this time, however, indicate that the type of forage poisoning in horses and mules caused by the ingestion of an oat hay and an ensilage in remote outbreaks in Kentucky are closely related if not identical with a sporadic and clinical forage poisoning observed by Professor H. P. Rusk and Dr. H. S. Grindley* of the University of Illinois occurring on the McLean farm at Ottawa, Illinois.

*Presented at the 54th Annual Meeting of the American Veterinary Medical Association, Section on Sanitary Science and Police, Kansas City, Mo., August, 1917.

*Unpublished report.

In this paper are given a few preliminary experiments, with photographs, extracted from bulletins Nos. 207-208 of the Kentucky Experiment Station. The results of these studies corroborate in a measure the theory advanced by the late Dr. Leonard A. Pearson, wherein he mentioned the clinical analogy of forage poisoning in animals to meat poisoning in man. Infections of this type in man arising from extracellular toxin producing organisms are amenable to serum prophylactic treatment as pointed out by Kempner and Wasserman. The serological treatment of forage poisoning is thus suggested as the result of the apparent relation of serum immune to *B. botulinus* in protecting against a micro-organism resembling *B. botulinus* isolated at the Kentucky Station from three feeds obtained from natural outbreaks of the disease. Serum immune to the strains isolated from the feeds proved equally efficacious in protecting small animals against a fatal *B. botulinus* infection as well as an artificial infection arising from the homologous strains.

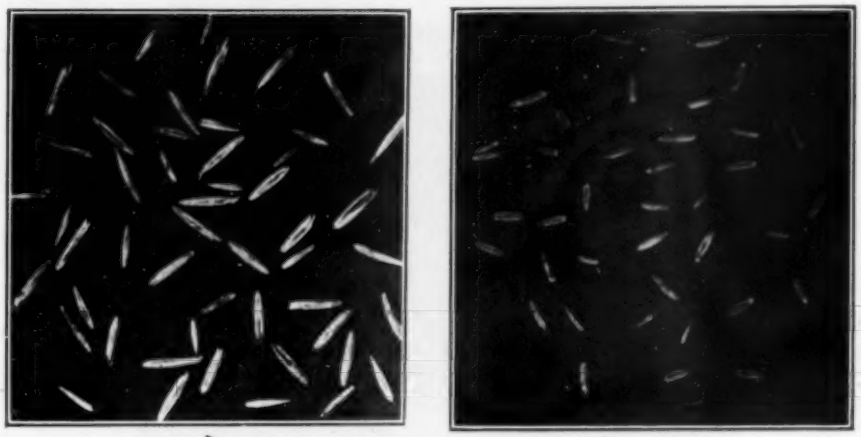
Following a natural outbreak of forage poisoning in horses an oat hay was secured that possessed the property of producing clinical forage poisoning subsequently to ingestion. (See Figs. 1, 2 and 3.) The oat forage was moved to the Experiment Station where the threshed grain separated from the straw, as well as the straw independently, proved capable of producing clinical forage poisoning in horse and mule stock subsequently to ingestion. Water in which the grain and straw were immersed proved likewise infective to horses subsequent to drinking. Chicken feces obtained from the oat straw after threshing, disguised in wholesome feed of a horse, resulted in the disease, while chicken feces from remote sources, disguised in wholesome feed of horses, was not productive of the disease. Chickens, rabbits, guinea pigs, swine, sheep and goats freely consumed the poisonous oat grain without noticeable effect.

Contaminated feed may apparently retain its infective quality for several months in that two barrels of the oat hay in question were reserved for approximately two years and upon allowing horses to drink water in which the oat hay was immersed clinical forage poisoning resulted.

In 1916 Drs. Buckley and Shippen** brought out the patho-

**Jour. Amer. Vet. Med. Ass'n, 1917, 50, New Series 3, No. 7, pp. 809-816.

genic nature of *B. botulinus* to horses, and noted a clinical and anatomic resemblance of *B. botulinus* intoxication artificially induced in horses to sporadic forage poisoning. The pathogenic character of *B. botulinus* for horses as pointed out by Buckley and Shippen



Figs. 1, 2 and 3, Bulletin 207, Kentucky Experiment Station
Griffith Oat Hay and Threshed Grain

was observed by the writers following the ingestion of 2 c.c. broth culture *B. botulinus** disguised in wholesome feed and as the result of injecting 0.1 c.c. subcutaneously. The intoxication observed

*B. botulinus strain (N. B. S.) from Dr. Buckley, Washington, D. C.

following artificial infection with *B. botulinus* presented in some experimental horses symptoms and gross anatomic lesions resembling those found in forage poisoning. It was also reported by Buckley and Shippen that chickens were not noticeably affected following ingestion of *B. botulinus* broth culture in feed, yet the feces from chickens fed *B. botulinus* proved capable of inducing

Fig. 4, Bulletin 207, Kentucky Experiment Station

fatal intoxication when fed to horses accompanied by the clinical features of forage poisoning.

Corroborating the infective property of chicken excreta following the ingestion of broth cultures of *B. botulinus* disguised in feed mule No. 89 was fed 95 grams of the chicken feces naturally voided. The feces were ground and thoroughly mixed in wholesome feed and given to the mule on December 21st. The ration of

this animal then consisted of wholesome feed and water. The animal appeared normal until the morning of December 26th, at

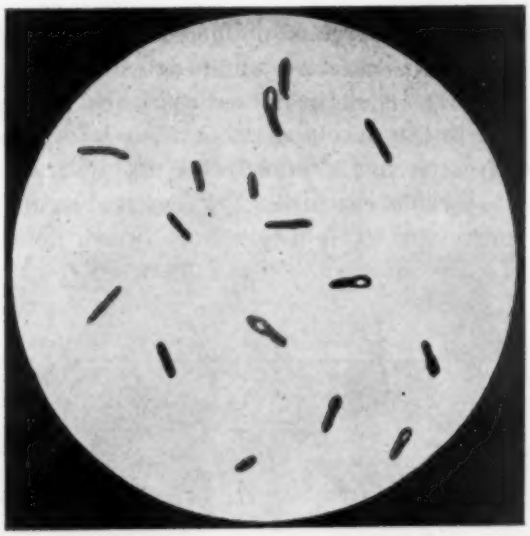


Fig. 8, Bulletin 207, Ky. Exp. Sta.

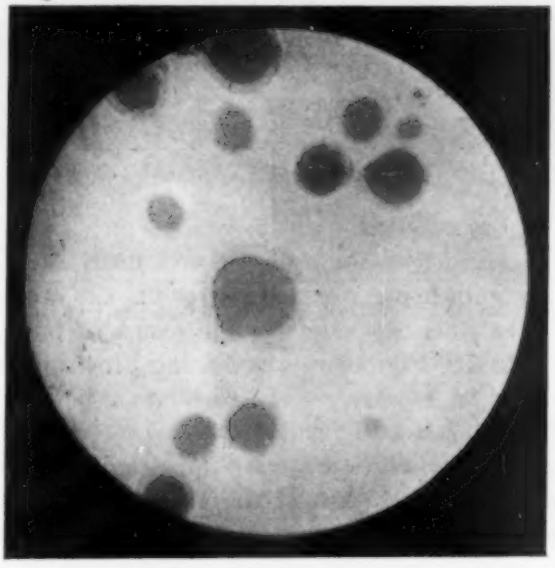


Fig. 9, Bulletin 207, Ky. Exp. Sta.

which time there was observed a marked muscular weakness, pharyngeal paralysis and restlessness; the tongue was paralyzed and

pendulous. Fig. 4 was made at 10 a. m. on December 26th and at 3 p. m. the animal became permanently decumbent, followed by death on December 27th.

From the internal organs of horses fatally afflicted from drinking the poisonous oat hay water previously mentioned numerous plantings were made in different cultural media under conditions favorable to the development of *B. botulinus*. Samples of the oat water direct from the barrel were also cultured and placed under similar favorable conditions. From the cecum contents of experimental horse No. 91 fatally afflicted from drinking the oat water, a Gram positive, anaerobic, sporulating, rod-shaped organism, 0.8 to 1 micron wide and 2½ to 6 microns long, was isolated.

Fig. 10, Bulletin 207, Kentucky Experiment Station

This organism resembled *B. botulinus* as to morphological and cultural characters and it was administered to small animals.

A healthy guinea pig received per os 0.2 c.c. broth culture of the anaerobic bacillus isolated from the cecum of horse No. 91 on February 14, 1917. Fig. 10 represents the prostrate condition of this pig at 11 a. m. February 15th, 24 hours after being infected. Death occurred at 7 a. m. February 16th.

Experimental horse No. 94 was allowed to ingest with wholesome feed 4 c.c. broth culture of the anaerobic organism isolated from the cecum of horse No. 91 on February 14, 1917. The animal remained apparently healthy until February 19th, at which time there was manifest paresis of the pharynx and a marked general weakness. The plate for Fig. 11 was made on February 19th and the following morning the animal was permanently decumbent.

After remaining in a moribund condition for three days death followed on February 23rd, nine days after feeding the culture.

Postmortem examination of horse No. 94 revealed hemorrhagic lesions in the outer wall of the small intestine and on the inner wall numerous punctate hemorrhages and highly injected areas were found. The gross findings at autopsy in other horses similarly infected involved congestion of the lungs, areas of hyperemia, congestion and hemorrhage in the mucous and serous membranes. In the connective and supporting tissue of the body gelatinous infil-

Fig. 11, Bulletin 207, Kentucky Experiment Station

tration was frequently observed. Gross changes were very slight or not discernible in other animals artificially infected.

From the cecum of horse No. 94 an anaerobic bacillus resembling the organism used to infect this animal (originally isolated from cecum of horse No. 91) was regained. 0.5 c.c. of the organism in broth given per os to guinea pig shown in Fig. 14 resulted in intoxication and death in 25 hours.

The fatal effect of *B. botulinus* as pointed out by Drs. Buckley and Shippen and the resemblance of artificially induced *B. botulinus* intoxication in horses to clinical forage poisoning prompted

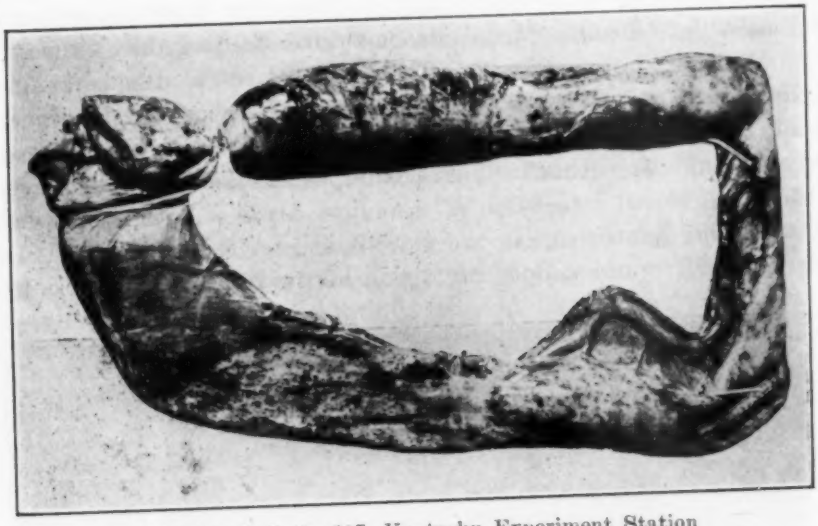


Fig. 12, Bulletin 207, Kentucky Experiment Station

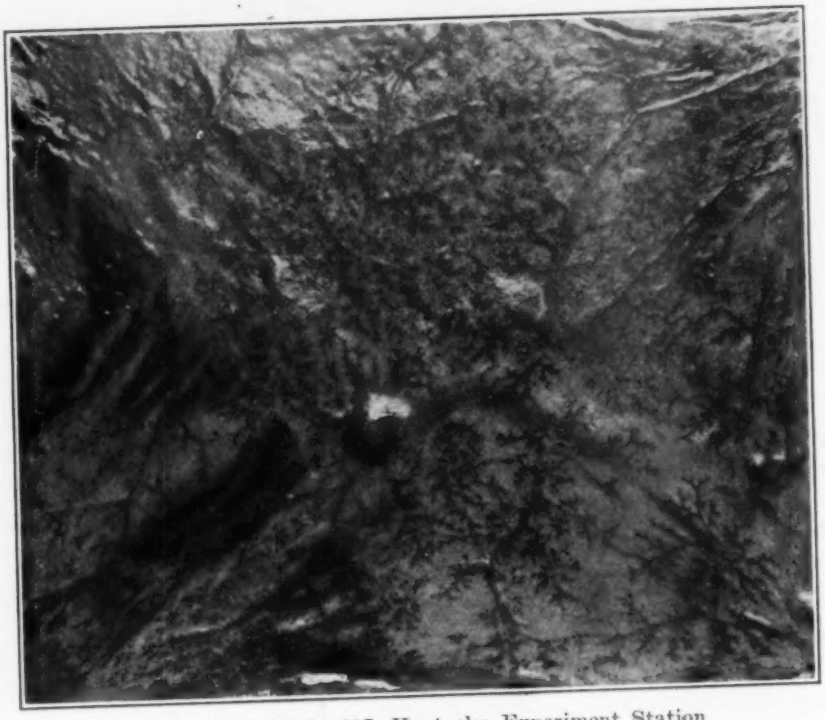


Fig. 13, Bulletin 207, Kentucky Experiment Station

the preparation of botulism antitoxin. In numerous experimental trials it was found that botulism antitoxin proved efficacious in protecting horses against an artificial infection of *B. botulinus* given per os and subcutaneously.

The protective quality of goat serum immune to *B. botulinus* against a fatal artificial infection of the homologous strain in

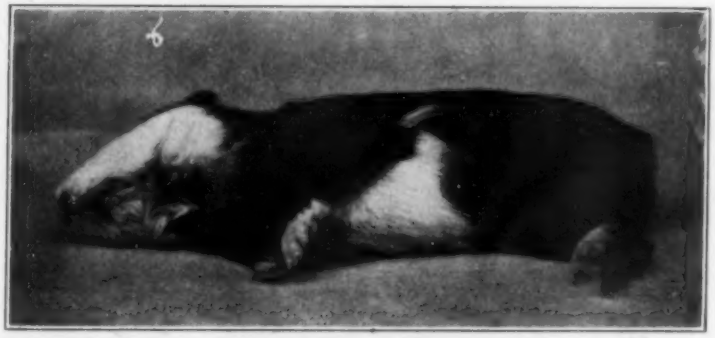


Fig. 14, Bulletin 207, Kentucky Experiment Station

Fig. 15, Bulletin 207, Kentucky Experiment Station

guinea pigs is shown in Fig. 15. The three animals in the rear received varying doses of serum intraperitoneally on March 13th, followed on March 14th by 0.05 c.c. of toxin (unfiltered *B. botulinus* broth culture) per os. The same amount of toxin was also administered per os to an untreated pig. Death occurred in the control pig in approximately 24 hours, while the pigs receiving serum remained apparently healthy.

The protective quality of botulism antitoxin against the broth culture of the organism isolated from the cecum of horse No. 91 is shown in Fig. 16. Varying doses of serum were administered intraperitoneally on March 15th to the three pigs in the rear, followed on March 16th by 0.05 c.c. per os of the broth culture of the organism isolated from the cecum of horse No. 91. A control pig was simultaneously infected with the same amount of the broth culture. Fig. 16 was made on March 17th, on which day the control pig died. One of the serum treated pigs shown in this test died on March 24th. The other serum treated animals remained apparently healthy. Duplicate tests on guinea pigs with varying amounts of serum apparently provided protection against many times the lethal amount of the organism.

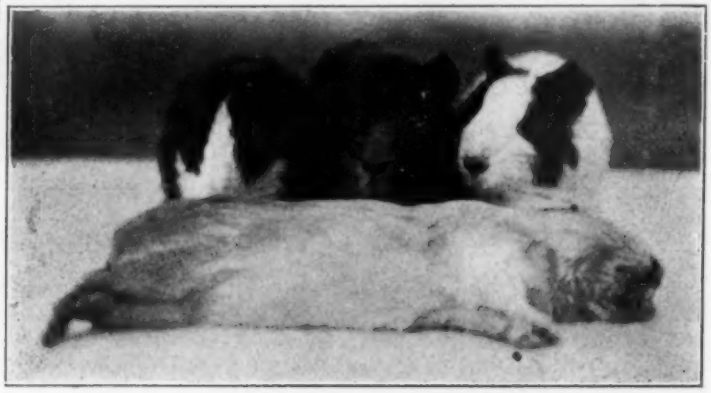


Fig. 16, Bulletin 207, Kentucky Experiment Station

Horses Nos. 98 and 99 received in wholesome feed 2 c.c. unfiltered broth culture of the anaerobic organism isolated from the cecum of horse No. 91 on March 6, 1917. These animals remained apparently healthy until the morning of March 8th at which time they were found in a decumbent and moribund condition. The preceding evening (March 7th) Nos. 98 and 99 consumed the grain but only a small portion of the hay allowed. Fig. 17 was made at 10 o'clock, March 8th. No. 98 died at 3 p. m. in the afternoon, while No. 99 survived until the following morning.

Horses Nos. 1002, 1003, and 1004 received two prophylactic injections of botulism antitoxin, followed by 4 c.c. (in doses of 1 and 3 c.c. at intervals of 9 days) of broth culture of the anaerobic organism isolated from the cecum of horse No. 91, in 1000 grams of

Fig. 17, Bulletin 207, Kentucky Experiment Station

Fig. 18, Bulletin 207, Kentucky Experiment Station

wholesome oats. Mule No. 105 received the same amount of the organism, but no serum.

Fig. 19 shows the same animals with No. 105 in a decumbent position. Mule No. 105 displayed a marked resistance and continued to eat for approximately 9 days following ingestion of 1 c.c.

Fig. 19, Bulletin 207, Kentucky Experiment Station

Fig. 21, Bulletin 207, Kentucky Experiment Station

broth culture but following the ingestion of 3 c.c. broth culture disguised in wholesome feed death occurred in 48 hours. The serum-treated horses, Nos. 1002, 1003 and 1004, remained apparently healthy and were released after 30 days' observation.

From the stomach of mule No. 105 an anaerobic organism resembling *B. botulinus* was regained which proved fatal when ingested by guinea pigs. In preliminary tests 0.5 c.c. of broth cul-

Fig. 22, Bulletin 207, Kentucky Experiment Station

ture was administered by the mouth to a guinea pig at 9:30 a. m. on March 30, 1917, resulting in death on March 31st at 3 p. m. Fig. 21 illustrates the prostrate condition of the animal 20 hours following the artificial infection per os.

Fig. 24, Bulletin 207, Kentucky Experiment Station

To observe the effect of the sterile culture filtrate of the organism isolated from the cecum of horse No. 91 and its serological relation to *B. botulinus,* horses Nos. 1005, 1006, 1007, 1008, 1009, 1010 and 1011 were injected with botulism antitoxin and allowed to consume 2 c.c. of the filtered broth culture of the organism isolated from horse No. 91 in 1000 grams of wholesome oats 25 hours later.

Fig. 23, Bulletin 207, Kentucky Experiment Station

Horse No. 104 received the same amount of the filtrate in feed simultaneously but was not injected with serum. Fig. 24 includes the same animals 7 days later, showing control in a moribund condition.

Control No. 104 4 days after ingesting 2 c.c. of the sterile broth filtrate, showed marked salivation and paralysis of the pharynx. (Fig. 23.) The symptoms in this animal were suddenly

manifest, developing rapidly after the fourth day. Death occurred 7 days following the ingestion of the filtrate. The serum-treated horses remained healthy and were released in 30 days.

From water in which the oat hay was immersed a similar pathogenic organism resembling *B. botulinus* was isolated and to determine its relation, if any, to *B. botulinus,* tests were made upon guinea pigs. Three pigs received intraperitoneally varying amounts of sheep serum immune to *B. botulinus,* followed in 24 hours by 0.1 c.c. per os of the broth culture of the organism isolated directly

Fig. 26, Bulletin 207, Kentucky Experiment Station

from the oat hay water. The pigs receiving serum remained healthy, while the control pig succumbed in approximately 40 hours.

The protective quality of cow serum immune to *B. botulinus* was also observed by injecting three pigs intraperitoneally with varying amounts of serum, followed in 24 hours by an artificial infection per os of 0.1 c.c. of the organism isolated from the oat hay. (Fig. 26.) The serum-treated pigs remained healthy, while the control pig receiving the same amount of the broth culture by the mouth succumbed in approximately 18 hours.

Horse No. 1012 was given a prophylactic injection of serum immune to *B. botulinus* on March 20th. Horses Nos. 107, 112 and 1012 received 2 c.c. broth culture of the organism isolated from the oat hay March 21st. (Fig. 27.)

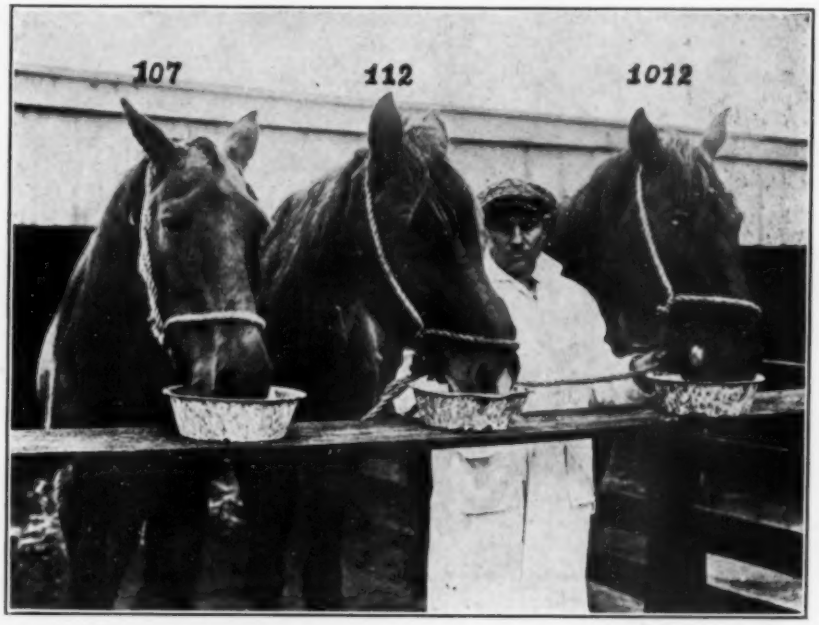


Fig. 27, Bulletin 207, Kentucky Experiment Station

On March 25th horse No. 107 was dull and stupid, with a noticeable impairment of the organs of deglutition. See Fig. 28. During the course of illness this animal salivated profusely. Mus-

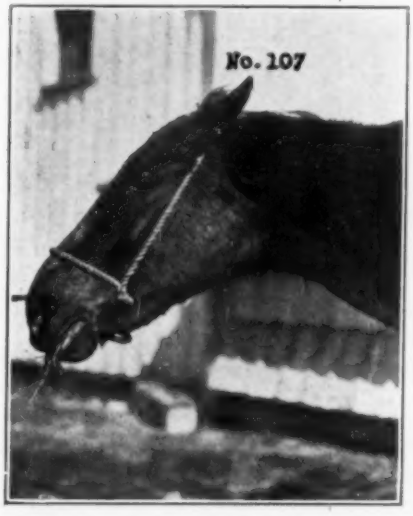


Fig. 28, Bulletin 207, Kentucky Experiment Station

Fig. 30, Bulletin 207, Kentucky Experiment Station

Fig. 31, Bulletin 207, Kentucky Experiment Station

cular weakness developed rapidly following the symptoms displayed on March 25th and the animal became permanently decumbent. Death occurred in No. 107 during the night of March 27th. Horses Nos. 112 and 1012 appeared normal. See Fig. 30.

Horse No. 112 showed no discomfort until March 30th, at which time the feed was prehended slowly and with some difficulty, though the appetite was apparently not impaired. Attempts to drink were continuous but the water was returned through the nasal passages. Corn was prehended, masticated and dropped upon the ground. See Fig. 31. The symptoms continued and were possibly augmented from this date, accompanied by marasmus.

Fig. 32, Bulletin 207, Kentucky Experiment Station

On April 5th the animal (No. 112) became permanently decumbent and death occurred during the night. See Fig. 32. On April 6th horse No. 1012 was to all appearances normal, though on March 30th a transitory reaction was observed, at which time antitoxic serum was administered. The manifestations soon subsided and the animal remained apparently normal and was released on April 30th.

Horses Nos. 1013, 1014, 1015 and 1016 received an injection of botulism antitoxin on March 27th, and on March 28th, together with untreated horses Nos. 109, 110 and 114 (See Fig. 33) were each given 1000 grams of wholesome oats in which were mixed 2 c.c. of the filtered broth culture of the organism isolated from the poisonous oats. Control horses Nos. 109, 110 and 114 all succumbed;

No. 109 died on March 31st, No. 110 on April 2nd, and No. 114 on April 7th.

The four serum-treated horses similarly infected and receiv-

Fig. 33, Bulletin 207, Kentucky Experiment Station

ing portions of the same wholesome feed displayed no symptoms and were released after 30 days. See Fig. 34.

Following a sporadic outbreak of forage poisoning in mules in Carroll County, Kentucky, a corn ensilage was proved by feed-

Fig. 34, Bulletin 207, Kentucky Experiment Station

ing tests to incorporate the causative factor of the disease. From the ensilage in question an anaerobic, Gram positive bacillus which in cultural and morphological characters seemed closely allied to *B. botulinus* (See Figs. 1 and 2) was isolated. In animal experiments it proved capable of engendering clinical forage poisoning in experimental horses and mules subsequent to ingestion of 2 c.c.

Fig. 1, Bulletin 208, Ky. Exp. Sta.

of the broth culture or the sterile filtrate of the broth culture, while .02 c.c. of the broth culture per os proved fatal to guinea pigs in 24 to 36 hours.

The apparent likeness of this organism to *B. botulinus* prompted the injection of animals with serum immune to *B. botu-*

linus, followed by artificial infection of the organism from the silage.

Three mature guinea pigs were given intraperitoneally on May 12, 1917, varying amounts of goat serum immune to *B. botu-*

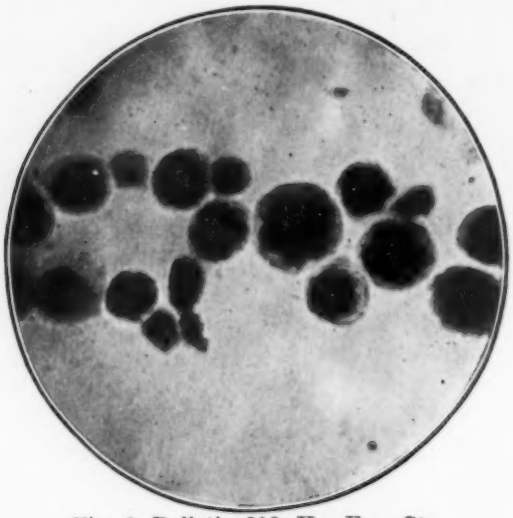


Fig. 2, Bulletin 208, Ky. Exp. Sta.

Fig. 3, Bulletin 208, Kentucky Experiment Station

*linus** and 24 hours later these animals received per os 0.1 c.c. broth culture of the organisms from the silage. A control pig receiving the same amount of broth culture but no serum died in 48 hours. (See Fig. 3.) The serum treated pigs remained healthy.

*N. B. S. Strain from Dr. Buckley, Washington, D. C.

The apparent serological relation of serum immune to *B. botulinus** to the filtered broth culture of the organism from the ensilage was observed in similar tests, wherein guinea pigs were apparently protected by intraperitoneal injection of the serum against

Fig. 4, Bulletin 208, Kentucky Experiment Station

an amount of the filtrate given by the mouth sufficient to cause death in a control pig in 3 days. Fig. 4 depicts the results of the filtered broth culture in an untreated pig while the serum pigs remained healthy.

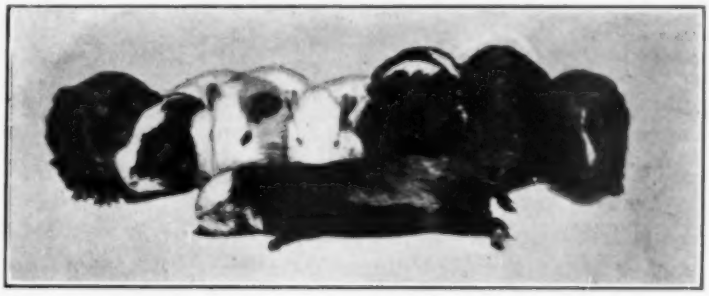


Fig. 5, Bulletin 208, Kentucky Experiment Station

The apparent protective quality in guinea pigs of serum immune to *B. botulinus** against the organism from the ensilage was followed by injecting serum immune to the organism from the ensilage into guinea pigs followed by a fatal amount of *B. botulinus.**

*N. B. S. Strain from Dr. Buckley, Washington, D. C.

Intraperitoneal injection of varying amounts of serum immune to the organism from the ensilage apparently protected guinea pigs against an amount of the unfiltered broth culture of *B. botulinus* given by the mouth which caused death in an unprotected pig in 48 hours. (See Fig. 5.) One of the low dose pigs, however, died in nine days after receiving the serum. The remaining serum-treated pigs remained apparently healthy.

The apparent protection afforded in guinea pigs against the organism from the silage by injecting serum immune to *B. botulinus* was followed by similar trials in horses.

Fig. 6, Bulletin 208, Kentucky Experiment Station

Horses Nos. 1019, 1020, 1021, received an intravenous injection of botulism antitoxin on May 15, 1917. On May 16th these horses and an untreated mule, No. 118, were each fed 2 c.c. of the broth culture of the organism from the ensilage mixed with 1000 grams of wholesome oats. The animals were then allowed wholesome feed and water.

On the morning of May 17th No. 118 ate only a portion of the grain ration, while the three horses injected with serum appeared normal. At 10 a. m. No. 118 fell and could not regain a standing position.

At 3:45 p. m. the plate for Fig. 7 was made. No. 118 died at 3:30 p. m. The tongue was paralyzed and protruding from the mouth.

Post mortem examination showed gross lesions similar to those observed in animals naturally afflicted with forage poisoning.

From the preliminary studies, as extracted from bulletins 207-208 of the Kentucky Station, the writers are inclined to the belief that certain types of forage poisoning may result from the ingestion of feed contaminated with microorganisms resembling *B. botulinus*. The experimental results obtained by injecting animals with serum highly immune to *B. botulinus* as well as serum highly immune to organisms resembling *B. botulinus* isolated from poisonous forages followed by a fatal infection of *B. botulinus* or of the organisms closely resembling *B. botulinus* are suggestive of the possible value of serum in natural outbreaks of this disease.

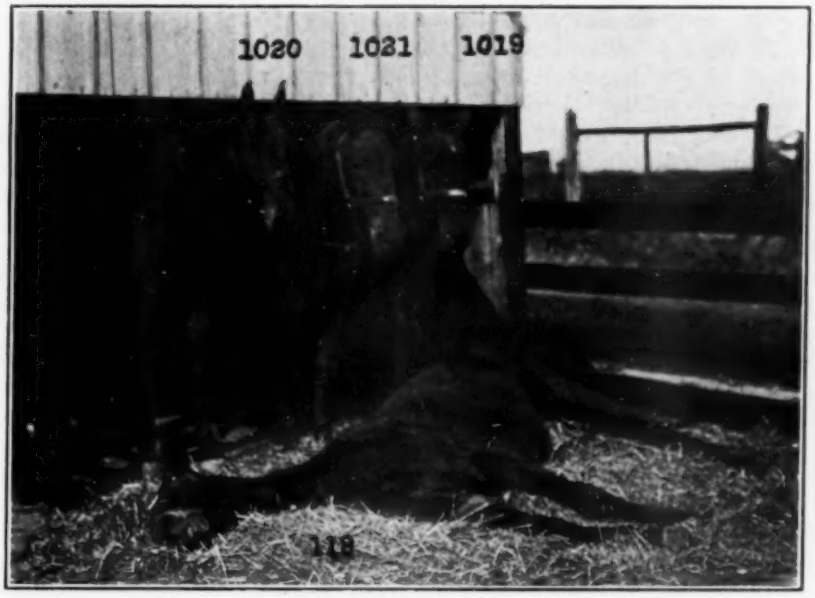


Fig. 7, Bulletin 208, Kentucky Experiment Station

It is not assumed that forage poisoning in all its phases result from infections of this type but the occurrence on forage of organisms resembling *B. botulinus* which, upon being artificially propagated in the laboratory have proven capable of engendering clinical forage poisoning in horses subsequent to ingestion, is regarded as contributive to our knowledge of the etiology of this disease. Supportive of this contention is the cultivation of *B. botulinus* and organisms resembling *B. botulinus* in forage extracts. The experimental evidence presented is supportive of the theory originally advanced by Dr. Leonard A. Pearson, while at the meeting of the

American Veterinary Medical Association in 1916 Drs. Buckley and Shippen pointed out the likeness of *B. botulinus* intoxication artificially induced in horses to sporadic forage poisoning.

Discussion

Dr. Eichhorn: The so-called forage poisoning is a disease of considerable importance and the work of Dr. Graham plainly indicates that great steps have been made towards shedding light on the nature of the disease which up to date has baffled veterinarians. As Dr. Graham has pointed out, the work carried out by Drs. Buckley and Shippen has demonstrated that the *Bacillus botulinus* possesses pathogenic properties for horses and furthermore that the *Bacillus botulinus*, and especially its toxins, has repeatedly caused death of horses even when fed in small doses.

The symptoms manifested by animals artificially infected with the *Bacillus botulinus* or its toxins somewhat resemble those of forage poisoning. The inauguration of this work by Drs. Buckley and Shippen was undertaken under my direction and I followed it with the greatest interest since even initial investigations appeared to have established a relation between forage poisoning and botulinus intoxication. Not only cultures of these organisms but also the toxins alone when fed even in very small quantities to horses produced symptoms of forage poisoning. The remarkable feature in these experiments appeared to be that the feeding of only very minute doses of the toxins were required to produce symptoms to a condition which closely resembled forage poisoning.

Subsequent experiments have established that droppings collected from chickens after feeding them with cultures of the *Bacillus botulinus* have also repeatedly produced death in horses with symptoms of forage poisoning. These findings probably elucidated the experimental work which was previously reported by Dr. Graham on forage poisoning in which he found that chicken droppings contained in oats were responsible for losses in horses with forage poisoning. The work now reported by Dr. Graham has further advanced our knowledge on the etiology of the disease and has given us a definite knowledge on the causative agent of the disease. Besides, he even went further and demonstrated that a disease which in all particulars resembles forage poisoning may be successfully combated by protective immunization. As no doubt most of you know the *Bacillus botulinus* has been and is known as the organism causing sausage or meat poisoning and in the early work with this organism a serum was developed for the treatment of this infection in human beings. No doubt, however, credit is due to Dr. Graham for furthering and developing it with regard to its application for animals. Besides such serum might possess great curative value for animals infected with forage poisoning.

There is only one more word. While these important factors have been established by him experimentally it will be of interest to undertake immediately further investigations along this line in order to establish whether actual outbreaks of forage poisoning occurring under natural conditions are caused by botulinus infection and whether the losses sustained from this disease are due to botulinus intoxication. It appears to me that this is the case but no doubt further work is required to establish it beyond a doubt.

DR. GOSS: The work of Dr. Graham is very interesting and shows quite conclusively that the forage poisoning with which he came in contact in Kentucky was due to the *Bacillus botulinus.* I have observed the different forms of diseases which have been called forage poisoning and have followed them carefully during the horse plague in Western Kansas and Nebraska. It has occurred in other places. There seem to have been more or less characteristic lesions in the brains of the horses. I did not get the symptoms as shown in this disease in Kentucky. There was usually a rise of temperature before the symptoms developed, more or less jerking, fall of temperature and increasing paralysis. On examining the brain, we found certain infiltrations which seemed to be quite characteristic of that particular disease. In some respects it was similar to Borna's disease, as described as existing in Europe, but there seems to be a different cause. We were unable to find intracellular or intramolecular bodies.

We have throughout the greater portion of the United States, or through the corn belt, the disease forage poisoning, which occurs where horses are allowed to eat quantities of moldy corn. In these cases we find large softened areas within the brain; the softened area nearly always occurs in the cerebrum; it may be on either side, or on both sides, and those cases are quite typical. The losses are very high indeed where we have had a bad visitation in a particular season.

There is a form of this disease where the fatality is quite high. The symptoms to all appearances are quite similar to those described by Dr. Graham. On examination of the brains of these animals no pathological changes are found, except indications of fatigue. In another instance, the animals did not show any increase in temperature, their temperatures were so normal that they were sleepy, and with paralysis, the tongue would hang out. The temperature would gradually go lower and lower until death resulted in the course of about 48 hours.

In another epidemic the animal showed symptoms more or less characteristic of influenza, and it had been diagnosed as influenza. The animals were eating fodder which was exceedingly moldy. The temperatures were high at first, and continued high, in this instance around 106 degrees; the heart beat was exceedingly rapid,

and very weak, almost imperceptible, and nearly all the animals died within 48 hours. Unfortunately I did not get a post mortem on any of them. They were fed upon alfalfa, which looked quite good, but it had a peculiar odor, a sort of tobacco odor. That man lost about six horses. Out of eight or ten which were affected there were only three or four recoveries. We took some of the alfalfa to the laboratory and fed part of it to eight guinea pigs, and six out of the eight died. Further work was done in isolating the organism and we succeeded in isolating quite a number of organisms. This was done sometime ago before this work came out on *B. botulinus*. There is a possibility of an anaerobic, and I am wondering if it is a different form of anaerobic than the one found in Kentucky. In my observations there were only four forms of disease which were caused by feeding forage. The symptoms may be different but Dr. Graham's work will encourage, I think, further work along the line of isolating anaerobics, and it may be we do not do enough work in isolating organisms, as it is out of the ordinary technique of some laboratories.

DR. AMLING: There is no question in my mind that the condition is analogous to what we have in the East. I have had considerable experience and I find the same conditions from products eaten by animals and humans and in 99 out of 100 cases I say the conditions are due to fungi and poisons in the food.

I recall one case in particular—I know of several—that I had last summer. There was a poultry market where they bring in the poultry from the different markets, and keep and feed them for a few days. Across the street from a poultry market was a tumble down shack in which several people lived. The children would play about the gate and poultry plant. I found poultry showing conditions of paralysis. A little girl was stricken with disease and died a day or two afterward. I found a typical case of poliomyelitis in the poultry owner's horse which I was called to treat. I was associated, and am at the present time, with a gentleman named R. F. Hof, whom I consider one of the best bacteriologists and microscopists in the country, and he in each and every case has found these same bacilli, also micrococci and bacteria. These conditions passed along from one child to another. They all lead to the same termination—death in many cases. I do not suppose there was ever a time when we had the amount of fungi, molds, etc., that existed at that time all through the East. The cherries and berries could hardly be used; they were brought to the market on Friday or Saturday and by Monday, and in many cases in 2 hours, developed this mold. The merchants and producers all suffered severe losses because people would not buy. Berries would be bought in the afternoon or evening, placed in refrigeration, and probably served to a child the following morning with milk and sugar, which is a culture medium. The children were playing in

the street, and there were changes in the atmospheric conditions, fogs, and variations of temperature many times of 40 degrees within ten hours. The children were perfectly healthy in the evening and the next morning after eating some of the berries they would appear to be afflicted with paralysis. There were intestinal troubles. There were gastric conditions and pains in head and cervical region (superior) and sudden death. There were many cases of inflation of the intestinal tract or stomach. In many of those cases a physician would be called, and a great many times he would diagnose it as a case of pneumonia. The distension of the abdomen and the pressure on the diaphragm minus temperature and the lower portion of the bronchial organs, caused a certain sound on account of the air retained there. The inhalation was probably free, and the exhalation probably arrested, causing pulmonary rales due to pressure on diaphragm due to gastric inflation, etc., which caused them to diagnose a condition of pneumonia, when pneumonia was not present. In many cases there was a lesion in the pulmonary tract (and pneumogastric). It was natural to find lesions there on account of the improper circulation of the air. These conditions I have found and have seen for many years. Most of these cases, to my mind, are brought about by various fungi, and a close and careful examination will usually find the cause.

Not many years ago I was called to several stock farms. There were quite a number of hogs, cattle, especially cows and their calves affected, and the first thing I did was to go over the ground. I found a lot of grain which I think was composed of kiln dried matter. It was supposed to be used in fattening cattle to kill, some to increase the milk supply, and the entire mass was impregnated with a dry fungus.

Another condition existed in a herd of very high grade Holsteins, some of the best in this country. A man lost several calves, and he sent the various parts of the organs down to us to examine. We found one and the same conditions in all of them, and the consequence was we investigated the feed and found the same fungi, also the bacteria, bacilli and micrococci always found present in the same condition. They had an enclosed space out in the country and were feeding, at that time, on fungus alfalfa, which I consider one of the most dangerous feeds for live stock. I do not know of any feed outside of corn that contains as many fungi as the alfalfa does, and takes as many of the elements out of the soil.

In another instance, we found on many farms a grade of bran which was supposed to be the very best grade that could be purchased. We found peanut shells ground up in it to increase the weight. Somebody was evidently making a large profit and in that peanut bran we found the same fungi.

Another instance, there was an infection among dogs some years ago. I found it in performing dogs which had eaten certain biscuits. The profession has not given sufficient attention to the question of feeds. The owner lost four or five dogs in probably 24 hours, and during the same time there were as many more paralyzed. When the owner got down through New England around Meriden three of them died in three hours. The veterinarians did all they could. The dogs were sent to Harvard, and no lesions whatever were found. The first thing I did was to look over the biscuit, and I found the same mold or fungus. I changed their diet and the condition was immediately removed. On two occasions there was a slight attack in the same group with the result that the owner had to purchase food at random when the supply gave out. In both instances the trouble was corrected by immediate correction of the diet and application of an intestinal antiseptic immediately administered. I kept them supplied for just such emergencies.

DR. A. H. BAKER: I am particularly interested in this matter on account of the reference to the horses which died at Ottawa, Ill. Conditions surrounding that case were investigated by a scientist. It was at my suggestion that the scientist at the State University was called in. I recognized, when I was called there in consultation with a local practitioner, that we had cases of forage poisoning. Before I arrived five or six horses had died, and they all died with the symptoms that Dr. Graham described. The first symptom developed was pharyngeal paralysis, and the other conditions, including the recumbent position, in which the horse was unable to rise, and death in from 48 to 72 hours. We found on investigation that the owner had just started to feed from silos. The upper portion, a foot deep of that silo, was pretty moldy, he knew it was not fit for food and took it out, and when it was dry he hated to throw it away, so he used it for bedding his horses, instead of bedding with straw, and to his surprise the horses ate this stuff. In the course of 24 to 48 hours they developed symptoms, showing a temperature and died in 2 or 3 days.

On investigation the scientists of the State University bought some old horses and fed this same stuff to them; the same symptoms developed and death ensued. They concluded that the moldy ensilage was the cause of the forage poisoning. In this connection we all know that some molds are harmless, while some molds are very fatal. I would like to suggest to Dr. Graham, now that he has started on this forage poison investigation, that he give us the result of a little further investigation, and enable us, if possible, to differentiate between poisonous and non-poisonous molds. It appeals to me particularly, because I believe forage poisoning is a very difficult problem for the practitioners to deal with.

DR. GRAHAM: The outbreak of forage poisoning at Ottawa, Illinois, referred to by Dr. Baker, was investigated by Professor H. P. Rusk and Dr. H. S. Grindley of the University of Illinois. If I an correctly advised, by a series of feeding experiments they were able to prove quite conclusively that the silage contained the etiologic factor in the outbreak which occurred on Mr. Alexander McLean's farm near Ottawa, Illinois. Feeding experiments that had been outlined and conducted during the summer months of last year were incomplete when it came time to refill the silo. The contaminated silage was covered with fresh silage. Separating the contaminated silage from the fresh silage was a layer of oil cloth. The new silage was fed by the owner with apparently satisfactory results. After removing the oil cloth covering, the contaminated silage was used in further feeding experiments conducted by Professor Rusk and Dr. Grindley during the past few months, at which time it was shown to possess its original toxic properties, and fatal results were consistently obtained in horses that were allowed liberal amounts of this feed.

Several horses in these tests were given anti-serum while three or four controls or untreated horses receiving similar rations succumbed after manifesting typical symptoms of forage poisoning. The results of their studies have not as yet been published, but from correspondence and first-hand observations during the course of the experiments it seems that the horses receiving serum were protected from the poisonous effect of the silage.

Replying to the question presented by Dr. Goss relative to the presence of gross lesions noted in the cerebrum of experimental horses, I might say that upon autopsy observations indicate the large areas of degeneration, or rather disintegration, to which Dr. Goss refers, are rarely present, at least not consistently so in our observations to date. The temperature of affected animals as a rule is not elevated. Numerous recorded temperatures of animals suffering from the disease, both naturally and artificially, indicate that some may show a high temperature while a larger number show a normal or sub-normal temperature.

The relation of pathogenic molds to this disease have not been overlooked in our investigations but on the other hand numerous attempts have been made to determine the pathogenic properties of certain species of these organisms found upon animal feeds. The results obtained from time to time in this connection quite agree with the observations by different investigators relative to the role of the common molds in forage poisoning. It may be, however, that certain molds or other non-pathogenic organisms may be involved secondarily. In fact, laboratory experiments seem to confirm such a supposition, providing *B. botulinus* may be incriminated as the common etiologic factor in this disease. The

occurrence of *B. botulinus* upon forage is apparently not indicated by the presence of molds yet it is possible that certain molds may favor the field for its growth and development. *B. botulinus*, in the presence of certain molds, will grow under aerobic conditions or even in distinctly acid medium, two cultural conditions which are not favorable to the development of *B. botulinus* independently. The modification brought about by secondary organisms in association suggests a symbiotic relation and there is little doubt that other saprophytic organisms as cited by Van Ermengem, Buckley, and Shippen, may create conditions favorable for the development of *B. botulinus* in nature, accompanied by the production of its specific toxin.

SHEEP PESTS, PARASITIC AND PREDACIOUS*

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It is said of sheep that they have ever been in the vanguard of civilization. As to this the history of the sheep industry in our own country affords an example. Moving constantly westward with the attraction to newer and cheaper lands, it came to occupy increasing areas of western range country until it seemed that wool and mutton production in any considerable scale belonged to the far-west. However true this may have been under past conditions, the decreasing extent of the ranges by their constantly increasing occupation has brought about a new era upon which must follow a more intensive system of animal husbandry. Under such a system sheep and wool production takes its place upon the higher priced land of the small farm where, with improved stock, better care, increased productiveness, and the attractive prices of an unsupplied demand, it should prove a profitable branch of farm industry. In certain localities this is already in evidence. The serious shortage in the supply of wool and mutton is not likely to be relieved, however, until familiarity with sheep and methods of caring for them becomes more general and certain elements of discouragement to the industry are eliminated or placed under more effectual control.

Reference to the 1915 report of the Pennsylvania Department of Agriculture will show the estimated number of sheep in Pennsylvania for that year to be 806,000, having an approximate total

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value of $4,352,400.00. This estimate would indicate a decrease of 30% from the estimated number of sheep in the state ten years earlier, there seeming to be a decline of about 3% per year.

The contribution of Pennsylvania to the present shortage of American grown wool, as shown by the above figures, may be due mainly to the lack of appreciation of sheep husbandry as a profitable branch of live stock industry. Two other factors, however, weigh heavily as a contributing cause, if they do not in themselves constitute the main one. These are the susceptibility of sheep to parasites and the losses by death and injury from dogs. Both have been besetting causes of discouragement to flock owners, dogs contributing to the pillage not only in a predatory sense but, in a less degree, as carriers and disseminators of certain of the parasites with which sheep are invaded.

The losses from the ravaging of flocks by dogs progressively increases with increased density of human, and consequently of canine, population. Pennsylvania, with its numerous towns and industrial centers, has its concomitant quota of dogs, and this has caused the dog problem as it relates to sheep to be peculiarly applicable to this state. Data compiled by the Bureau of Statistics of the Pennsylvania Department of Agriculture relative to the extent of this damage for the year 1914 set forth among other summaries the following:

Total number of sheep killed	5,187
Total number of sheep injured	3,813
Amount paid for sheep killed and injured	$ 46,640.70
Amount of dog tax collected	147,815.88

These losses in killed and injured do not, however, represent the entire damage. A flock once attacked becomes restless, excitable, and for weeks afterward will rush about and become on the alert at slight and harmless intrusions to which they would ordinarily give no attention. The check in the normal gain of the flock from this cause may be considerable and constitutes a loss for which the owner is not reimbursed. A good sentinel against unwelcome intruders is the sheep dog of America, the Scotch collie. This can be appreciated by anyone who has seen a well-trained one at work; going about his duties quietly, aggressively challenging any trespassing cur, and at night warning the herdsman of lurking prowlers by his bark. A poorly trained and bad-mannered collie, however, is worse than a nuisance and should be classed with the common pack of sheep

damaging dogs. It is generally known that dogs that are well cared for, both through their restraint and a certain lack of inclination, are not likely to attack sheep. It is the unrestricted prowler, reverting in his night rovings to the predatory instincts of the wolf, that is the offender, either alone or encouraged by a pack of similar sneaking marauders. Such dogs should be hunted and destroyed as are any other plundering wild beasts.

But let us hope that we are now at the dawn of a brighter day for the sheep industry in Pennsylvania. On the fifteenth of this January there went into effect an enactment of the last session of the legislature which should pass the dog back into history as a serious obstructor. In its main features this law provides that on or before the fifteenth day of January of each year every owner of a dog shall obtain a license with which there will be issued a metal tag to be worn by the dog at all times. Between sunset and sunrise of each day dogs are to be confined in such manner that they cannot stray beyond the premises on which they are secured, unless under the reasonable control of some person. A dog seen in the act of pursuing, worrying or wounding any live stock, or attacking human beings, whether or not the dog bears the license tag, may be killed by any person, and there shall be no liability on such person in damages or otherwise for such killing. Under the duties of police officers in the enforcement of this law it is stated that it shall be the duty of every police officer to detain any dog or dogs which bear a proper license tag and which are found running at large and unaccompanied by owner or keeper. For failure to perform his duty under the provisions of this act, such police officer shall be liable to a penalty of $2.00 for each offense. For the performance of this duty he shall be paid the sum of $1.00 for detaining a licensed dog and the sum of $1.00 for the killing of a dog. Any person violating or failing or refusing to comply with any of the provisions of this act shall be guilty of a misdemeanor and, upon conviction, shall be sentenced to pay a fine not exceeding $100.00 or to undergo an imprisonment not exceeding three months, at the discretion of the court.

In these and in its further provisions we now seem to have a dog law with teeth, let us trust that they will be equal to the canines and carnassials of the carnivorous culprits. Be this as it may, its effectiveness will depend upon the interest of citizens in seeing to it that the law is enforced.

Clinical and laboratory experience has shown that sheep suffer

more from parasitic diseases than from those caused by bacteria. With other herbivorous animals they share hostage to the larval stage of certain of the numerous intestinal parasites of carnivora to which infection their habit of grazing close to the ground perhaps has an exposing influence. Furthermore, their dense fleece and tender skin affords an attractive harbor for the sustenance and propagation of the mites and ticks with which they are externally beset.

Observed parasitism of sheep may exist in one or two individuals; more often it involves most or quite all of the flock, or the infestation may be of an enzootic or even an epizootic nature. From the viewpoint of the most prevalent form in which the problem presents itself, measures looking to the prevention of the spread of the parasitism from animal to animal in a flock and from flock to flock in a sheep-raising district are of prime importance. Treatment for the expulsion of the parasites from infested individuals is essential as preventing direct loss by death and by decrease in the productiveness of the animals. Furthermore, an animal which may have been thus completely rid of the specific parasite and its eggs will, of course, cease to be a menace to the flock from this source as long as the freedom lasts. Obviously, however, the danger of reinfection and spread are not removed by this treatment unless it is supplemented by measures applied to the parasite external to the sheep host, for the effectual carrying out of which a knowledge of the life history is essential. Unfortunately this life history is not completely known as to certain malignant roundworm species infesting sheep, though enough has already been determined upon which to base in most cases decidedly effectual procedures of control. It has somewhere been stated that it may be taken as an axiom in helminthology that each worm in the body develops from an egg or larva which has entered from without. Worms, unlike bacteria, do not go on multiplying indefinitely with the production of new adult generations in the same host. It follows, then, that preventive measures dealing with parasitism should be based upon the life history of the species to which such measures are applied. Where this is known wholly or in part and such knowledge intelligently taken advantage of, the problem of eradication or control becomes much easier of solution than it otherwise would be.

A case in point pertains to a parasite of sheep and other ruminating animals, the common liver fluke, *Fasciola hepatica*. It has been stated that previous to the working out of the life history

of the fluke the loss in England from hepatic fascioliasis was for a time in the neighborhood of 3,000,000 head of sheep annually. The determination of the essential alternation of the fluke's parasitism between the sheep and snail host pointed the way for measures of control, consisting mainly in the elimination of snails by the elimination by drainage of places which harbored them, or in the limiting of the sheep to pastures free from standing water or overflow. Since the application of these simple preventive measures the loss from fascioliasis in England and other European countries has been greatly reduced. Apparently flukes have not been as prevalent among American sheep flocks as among those of Europe. To what extent this may be due to their being overlooked or to failure to report such cases cannot be determined, but it is probably true that whatever degree of actual immunity we enjoy from this pest may be largely accounted for in the fact that it has generally been the practice in this country to pasture sheep upon elevated and dry land rather than upon that which is low and marshy. There are, however, a sufficient number of cases of record to demonstrate the probability of fascioliasis becoming more prevalent with the growth of the sheep industry in the United States. There is, in fact, the possibility of its assuming in future years proportions of vastly greater economic importance than at present—even the dimensions of a ravaging plague—unless we are on the lookout for it and, where it appears, apply such measures as are indicated by the life history of the parasite.

The more serious symptoms in fascioliasis are usually among the lambs. Animals harboring but few flukes will give no evidence of functional disturbance, as has been demonstrated in slaughtering establishments where moderately infested livers have been repeatedly found in sheep in prime condition. In heavier infestations there is usually dullness, slow movement, and an inclination to lag behind the flock. Anemia is revealed in the paleness of the conjunctival mucosa, and there may be edematous swelling of the eyelids and perhaps of the brisket. Notwithstanding this the physical condition may remain good and, in fact there may be a tendency to fatten. Later, however, the symptoms become more aggravated, there is more edema in the dependent parts, the puffy conjunctiva forming a prominent ring around the cornea. With progressively diminished appetite there is loss of flesh, and, with the development of ascites, labored respiration, and diarrhea, the disease is

at its maximum, usually reached about the third month after infestation.

Other flatworms infesting sheep belong with the family Taeniidae or tapeworms. In animals which do not eat flesh infestation with adult tapeworms is comparatively uncommon, and in no such case is the life history of the infesting species known. Of the domesticated herbivorous animals probably sheep most frequently harbor these worms, infestations being most prevalent in the flocks of our far western states. A species which seems to be peculiar to sheep among our domestic animals is *Thysanosoma actinioides* (*Taenia fimbriata*) which is readily distinguished by the long fringes on the posterior borders of the segments. Other species occurring in sheep and also in cattle are *Moniezia expansa, M. alba,* and *M. planissima.* These when fully developed vary in length from three to twenty feet or more according to species. In all the segments are much broader than long, and in all the cephalic armature of hooks is absent. As nothing is known as to their cystic forms, the manner in which animals become infested remains undetermined.

Unless the tapeworms are present in unusual numbers, taeniasis does not, so far as clinical experience goes, seem to cause serious disturbance in sheep. Lambs born in the winter and turned upon grass early, when pastures are wet with the spring rains, are most likely to suffer. Where losses occur in such cases they are generally due to malnutrition and digestive disturbances in highly susceptible or heavily infested lambs, the toxins elaborated by the worms contributing considerably in bringing about the morbid condition.

During the past summer two yearling lambs—one dead, one living—were brought to our laboratory from a flock near Philadelphia, among which some losses had occurred. The carcass, on autopsy, showed anemia, marked parenchymatous degeneration of the heart muscle, liver, and kidneys, spleen normal, pronounced catarrhal enteritis, and an acute lung edema. The small intestine contained a number of tapeworms of the species *Moniezia expansa* which were unmassed, the fragments when laid out having a total measurement of about one hundred feet. During the two days which the other animal lived it was very drowsy, refused feed and did not ruminate. The temperature and pulse were taken once, there, as recorded, being 104.4°F. and 150, respectively. Autopsy

showed similar lesions to those of the first animal, the intestine containing tapeworms of the same species yielding a total length of about ninety feet.

Relative to toxins produced by intestinal worms, it is probably true that the effect upon the host does not necessarily depend upon the number of parasites present. The degree of virulence may vary with particular infestations, and, furthermore, there are undoubtedly cases of peculiar susceptibility, especially among young animals. It may be added in this connection that, as research workers in this field bring additions to our knowledge of the parasites and their pathogenic possibilities, evidences are being brought forth which point to the probability that certain verminous parasites, heretofore considered relatively harmless, are not so innocent as had been supposed and may be the primary offenders in certain conditions now assigned to other somewhat obscure causes.

Of the roundworms infesting sheep but two can be briefly reviewed within the present limits. Of these *Haemonchus contortus*, the species most commonly causing gastro-intestinal strongylosis, is probably responsible for driving more men out of the sheep business than any other adverse factor. The worm is thread-like, about three-quarters to one inch in length, and attaches to the mucosa of the fourth stomach and duodenum where it feeds upon the blood of its host. Infestations occur mostly among sheep which have access to low and marshy pasturage, young animals, as is the general rule in entoparasitism, being the greatest sufferers. Severe cases are accompanied by disorders of digestion and lead through loss of blood to pallor, dropsical conditions, and emaciation. Where a number of animals are involved any doubt as to the cause of these symptoms of a pernicious anemia may be cleared up by killing one and examining the fourth stomach. If there are heavy infestations this will reveal large numbers of the strongyles both free in the stomach's contents and deeply adhering to the mucosa, the latter showing the lesions of a subacute or chronic catarrh. It is significant as to the prevalence of the stomach worm that in sheep carcasses submitted to our laboratory for diagnosis it is the exception to find one entirely free from this parasite. It is often found in association with other parasitism, as strongylosis of the bronchi and lungs and nodular strongylosis of the large intestines, due probably to the fact that conditions which favor infestation with one are equally favorable to the other forms.

From what is already known of the life history of the stomach worm, it seems that infestation is direct, the larvae probably being taken up by the sheep with contaminated food and water. Becoming adult in the stomach, their eggs pass to the outside where they may hatch in a few hours or weeks according to more or less favorable conditions of temperature and moisture. Newly hatched larvae will not survive dryness or freezing, but if their vitality is sustained until they become surrounded by a chitinous sheath, they can then live under such conditions for a long period, and it is in this condition that they are infective. Becoming increasingly motile with a temperature rising above 40°F., and in the presence of moisture, as that from rain or dew, they make their way up the blades of grass to a position where they are readily taken up by the grazing ruminant. From the fact that the eggs and newly hatched embryos do not appear to be infective, and that dryness kills them before they reach their ensheathed or infective stage, it follows that the use of elevated pasturage with good natural drainage greatly reduces the chances of re-infestations. Systems of pasture rotation as a method of control are based upon the varying periods of time required for the newly hatched embryos to reach the infective stage under different mean degrees of temperature. At a constant temperature of about 95°F. this stage is reached in three to four days after the eggs have been passed. At 70° one or two weeks are required, while three to four weeks are necessary at about 50°. At temperatures below 40° the eggs will not hatch and larvae which may have reached ensheathment are inactive.

Under the usual climatic conditions of the northern part of the United States from November to March we are not apt to have a continuous temperature of over 40° for three weeks. There is, therefore, little chance of new infection from placing infected and noninfected animals together in clean lots or fields during this time. Based upon these findings, Ransom recommends a system of pasture rotation which is probably a very effective measure for the eradication of this parasite, although it involves considerable inconvenience. By this method animals which have been kept together from November through the winter, if removed in April to another clean field, may remain there for that month. In May the pasture is to be changed every two weeks. In June every ten days, and in July and August every week. In September the changes may be made as in June, every ten days, while in October a field

may be occupied two weeks or more according to temperature. The following year the same pastures can be used in the same order of rotation, as any field which has not been visited by sheep, cattle, or goats for one year may be safely considered as free from infection.

In verminous bronchitis of sheep, due to the invasion of the bronchi by strongyles, *Dictyocaulus filaria,* a thread-like worm two to four inches in length, is in most cases the offender. Two smaller species—*Synthetocaulus rufescens* and *S. capillaris*—are responsible for deeper seated lung lesions and may co-exist in the same animal with the common invader of the larger air passages. Many cases of verminous bronchitis are complicated with gastric strongylosis. In post mortem examinations, therefore, the stomach should not be overlooked, as the stomach worms may be responsible for a proportion of the losses. The lung invasion may be light, in which case there may be no more manifestation of it than an occasional cough. In severe cases the cough is more frequent and becomes paroxysmal, a distressing dyspnea often accompanying the attack. The bronchial secretion expelled tends to be lumpy, and usually, though not always, contains the adult and embryo worms. Relative to the degree of infestation, these symptoms may pass to extreme difficulty in respiration, emaciation, pallor, edema of the larynx, muzzle and eyelids, and finally lead to the death of the animal in a state of complete prostration. The duration of such cases is influenced by the toleration of the affected animal. Very young lambs may succumb in a few days from the first observation of symptoms. Strong adults, on the other hand, are likely to gradually recover during a course of six to eight months. The majority of unfavorable cases, however, are among the lambs, and most of these will run a course of two to four months.

The lungworms deposit their eggs in the respiratory passages of their hosts, and most of the freed embryos are expelled with the bronchial secretion. Further than this little is known of their life history. It has been shown that under favorable conditions of warmth and moisture they molt at least twice, after which they retain their cuticular covering and in this condition may resist drying for a considerable period. It is probable that these larvae find their way to the sheep host with wet grass or with water from shallow collections upon the pastures. That infection cannot occur directly from animal to animal has been shown by Leuckart, Herms

and Freeborn, and others, who were not successful in bringing it about by the introduction into the respiratory passages and stomach of bronchial mucus containing numerous embryos.

Prescribed limits will not permit even mention here of other internal and external parasites responsible for considerable losses among our flocks. But this whole subject of conditions adverse to the sheep industry has at the present time a side of broader importance than the purely economic one. It is stated that more than the entire wool production of the United States will be required for our armies. Relative to this the following figures are significant: in 1917 the wool crop of this country was 285,573,000 pounds, a decline of 4,619,000 pounds from that of 1914, and of 35,789,750 pounds from the crop of 1910. This in the face of the fact that from 1914 to 1916 there was a progressive increase of 187,323,399 pounds in our consumption of wool. As every ship will be needed for the transportation of our men and supplies to the countries at war, little can be imported to supply the tremendously augmented demand for an indefinite period to come. In view of these facts further comment as to the supply and consumption and sustained prices would seem unnecessary.

As this paper is addressed to an assemblage of veterinarians, it may be fittingly concluded with a word directing thought to the extent to which the welfare of the sheep industry must depend upon you. To you must logically fall the task of protecting our flocks from their worst enemy—the parasites. The efficient discharge of this responsibility calls for close study of more recent research in both the zoological and pathological fields of parasitology and a good working general knowledge of sheep as well. Superficiality has no place in the field of comparative medicine under present intensive systems of live stock husbandry. The appreciation of this by veterinary educators is indicated in the greater attention to the biological fundamentals and the bringing up of our courses to meet changing and more complex demands. Modern education in this branch of medicine requires that the student be fitted to intelligently co-operate with the advanced work of state and federal live stock sanitary organization, that he may so put his thought and training into action as to be an indispensable unit of service to his community in the eradication of such conditions as have caused the sheep industry to be almost completely abandoned in certain parts of the United States.

HORSE STRONGYLES IN CANADA

B. H. RANSOM, Chief of the Zoological Division, Bureau of Animal Industry, U. S. Department of Agriculture, and S. HADWEN, Pathologist, Health of Animals Branch, Canadian Department of Agriculture

During the summer of 1917 a cooperative investigation of the disease of horses known as infectious anemia or swamp fever was undertaken by the Health of Animals Branch, Department of Agriculture, Dominion of Canada, and the Bureau of Animal Industry, U. S. Department of Agriculture. In this investigation a trip was made into the Province of Saskatchewan by one of the present writers (S. H.) and localities in other provinces were also visited. Besides data relating to swamp fever the trip yielded a quantity of interesting parasitic material from horses and it is the particular purpose of this paper to record some of the findings concerning nematodes parasitic in the large intestine. The material has been only partly worked up but sufficient has been done to give a fair idea of the species represented.

Until the appearance of the important monograph of Looss (1902) on the Sclerostomidae of horses and donkeys in Egypt knowledge of the various kinds of nematodes that occur in the intestines of horses was very imperfect. Looss showed that the strongyles parasitic in the large intestine of the horse comprise numerous forms, and described and figured nineteen distinct species representing four genera. Prior to Looss the text books recognized only two or at most three species and assigned them to a single genus, *Strongylus* or *Sclerostoma*. At the present time five genera are recognized and the number of species has been increased to twenty-six. That other species still remain to be described is quite evident to anyone who has examined in detail specimens of strongyles from the large intestine of the horse.

The genera to which the strongyles of the large intestine of the horse belong are as follows:

Strongylus Mueller, 1780 or 1784 (=*Sclerostoma* Rudolphi, 1809).

Oesophagodontus Railliet and Henry, 1902.

Triodontophorus Looss, 1902 (=*Triodontus* Looss, 1900 [not Westwood, 1845]).

Gyalocephalus Looss, 1900.

Cylicostomum Railliet and Henry, 1902 (=*Cylichnostomum* Looss, 1902=*Cyathostomum* Molin, 1861 [not *Cyathostoma* Blanchard, 1849]).

[*Cylindropharynx* Leiper, 1911. This genus, two species of which have been described from the zebra in tropical Africa, is not yet known to be represented among the parasites of the horse.]

Very little has heretofore been published in America concerning the horse strongyles. Brief descriptions of the species found in Canada in 1917 (with the exception of the genus *Cylicostomum*) will be given in the present paper together with similar brief descriptions of the related species, not yet recorded in North America but likely to occur here. The genus *Cylicostomum* will be discussed only summarily as the Canadian material representing this genus has not been worked up in detail. In addition to a number of known species some new forms have been collected. Descriptions of these will be reserved for a future occasion.

Genus *Strongylus* Mueller, 1780 or 1784 (Type species, *S. equinus* Mueller).

Three species of this genus have thus far been recorded as parasitic in the horse and all three were collected in Canada during the summer of 1917. The adults of this genus can usually be easily distinguished because they are larger than most of the other forms that occur in the large intestine.

Species *Strongylus equinus* Mueller, 1780 or 1784.

The adults of this species measure, according to Looss, about 35 mm in length (male) and 45 to 47 mm (female). It is readily distinguished from the other two species of *Strongylus* occurring in the horse by the presence of three teeth in the base of the mouth capsule (two points on the dorsal tooth together with the two ventral teeth give the appearance of four teeth). *S. vulgaris* has one tooth and *S. edentatus* no teeth in the mouth capsule. According to Railliet (1915) immature forms of this species may be found in the pancreas and hepato-gastric ligament. Adults were collected at Lethbridge, Alberta, August 5.

Species *Strongylus edentatus* (Looss, 1900).

The adults (Looss's measurements) are 23 to 26 mm in length (male) and 33 to 36 mm (female). The absence of teeth in the base of the mouth capsule render this species easily recognizable.

Railliet (1915) states that immature stages occur in the subperitoneal connective tissue of the right side of the body and in the testicles of cryptorchids. A male and female 25 mm and 30 mm in length, respectively, were taken from the aorta of a horse examined post mortem at Lethbridge, Alberta, July 5. Full grown adults were collected at Lethbridge, August 5.

Species *Strongylus vulgaris* (Looss, 1900).

This is the smallest of the three species of *Strongylus* occurring in the large intestine of the horse. The adult male measures 14 to 16 mm in length, the female 23 to 24 mm (Looss's measurements). A single tooth is present in the base of the mouth capsule, but this tooth is supplied with two prominent rounded projections so that on casual examination there appear to be two teeth. According to

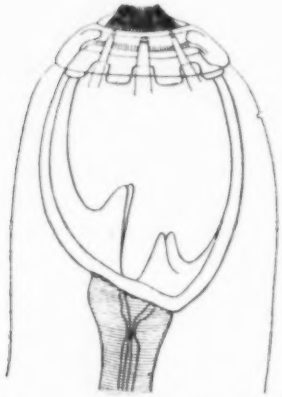

FIG. 1. *Strongylus equinus.* From Looss (modified). X29

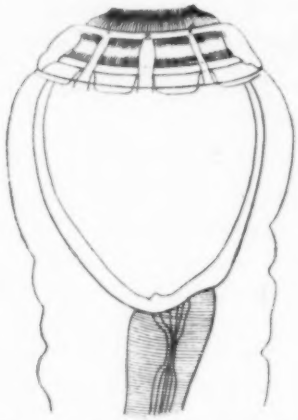

FIG. 2. *Strongylus edentatus.* From Looss (modified). X29

Looss (1902) it is the immature stages of this species which are concerned in the production of verminous aneurisms of the mesenteric arteries and other branches of the coeliac axis. Railliet (1915) states that the immature stages of *S. vulgaris* occur also in sub-mucous nodules in the wall of the large intestine. Adults were collected at Lethbridge, Alberta, August 5, and at Rosthern, Saskatchewan, August 31, in each case more numerous than individuals of the other two species of *Strongylus*.

Genus *Oesophagodontus* Railliet and Henry, 1902 (Type species, *Oesophagodontus robustus* [Giles, 1892] Gedoelst, 1903).

Only one species of this genus is known to occur in equines.

Species *Oesophagodontus robustus* (Giles, 1892) Gedoelst, 1903.

Length of male 15 to 16 mm, of female 19 to 22 mm. Mouth collar depressed, anterior margin tuberculated. Leaves of anterior leaf crown large, about 18 in number. Mouth capsule goblet-shaped, widest anteriorly; no dorsal gutter. Oesophageal funnel well-developed, the lining of its tri-radiate cavity modified to form 3 tooth-like structures, which do not protrude into the mouth capsule. Vulva 2.8 to 3.7 mm from the posterior end of the body. Dorsal lobe of male bursa lacking. Spicules end bluntly without

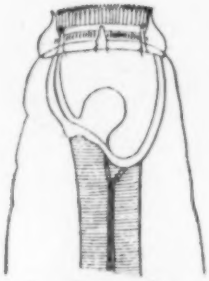

FIG. 3. *Strongylus vulgaris.* From Looss (modified). X29

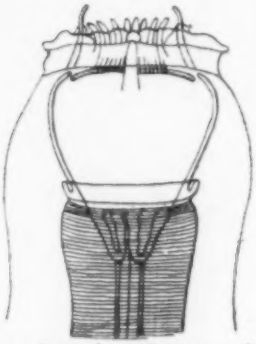

FIG. 4. *Oesophagodontus robustus.* From Boulenger (modified). X50

hook-like terminations. These few characters are taken from the more complete description given by Boulenger (1916). *O. robustus* has been recorded heretofore from India and England. It was collected at Lethbridge, Alberta, August 5, and Rosthern, Saskatchewan, August 31.

Genus *Triodontophorus* Looss, 1902 (Type species, *T. serratus* [Looss, 1900] Looss, 1902).

Looss originally described two species in this genus, *T. serratus* and *T. minor*. Sweet (1909) added a third species, *T. intermedius*, found in a horse in Victoria, Australia. This species was later collected in England by Boulenger (1916) who enlarged upon the description given by Sweet. Boulenger also described two other species collected from horses in England, namely, *T. tenuicollis* and *T. brevicauda*. In 1902 Railliet and Henry referred to the presence of *Triodontophorus* in France but did not mention the species. Linstow (1904) recorded *T. serratus* as present in India and Leiper (1910) recorded it as occurring in England. In Canada

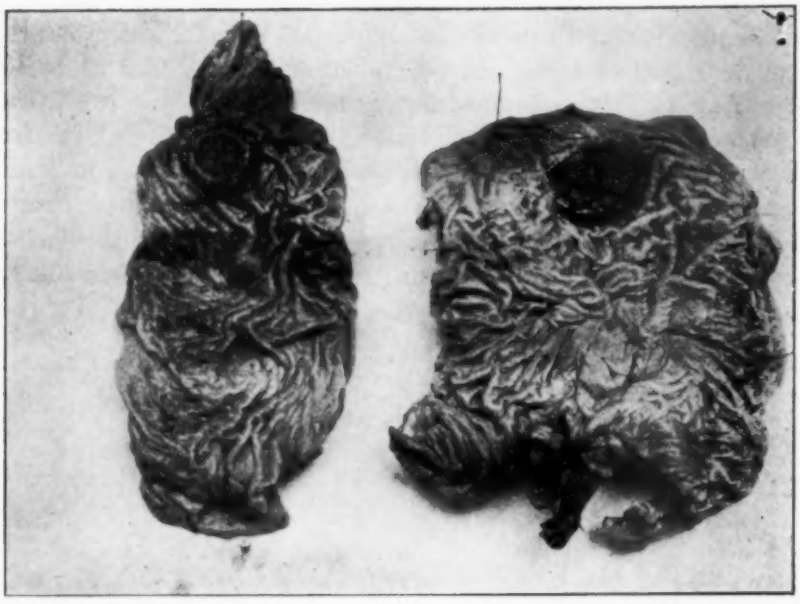

FIG. 5. Ulcers in colon of horse. From photograph.

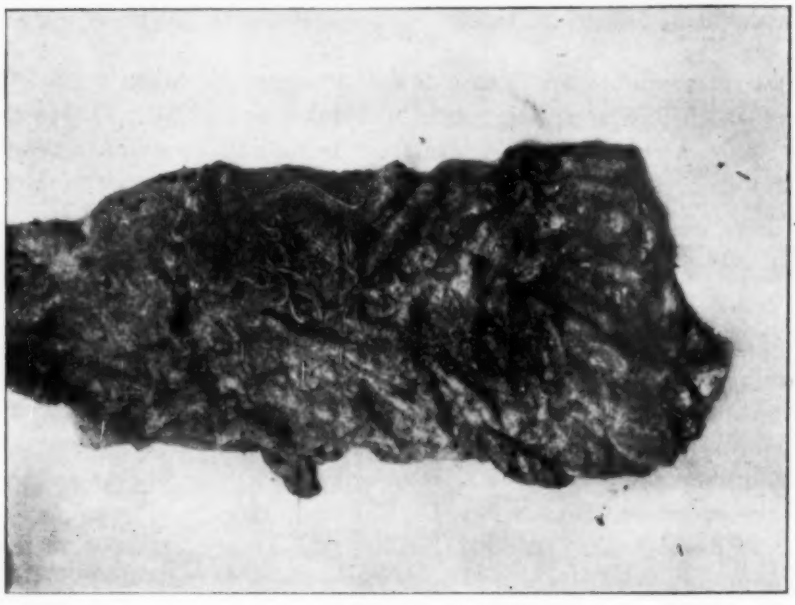

FIG. 6. Ulcer in colon of horse, showing worms (*Triodontophorus tenuicollis*). From photograph.

during 1917 neither of Looss's species was collected, but forms were found corresponding to each of the other three species.

From the standpoint of the pathologist an interesting fact concerning this genus, apparently not heretofore noted, is its relation to ulcerations of the mucosa of the colon, one of the species

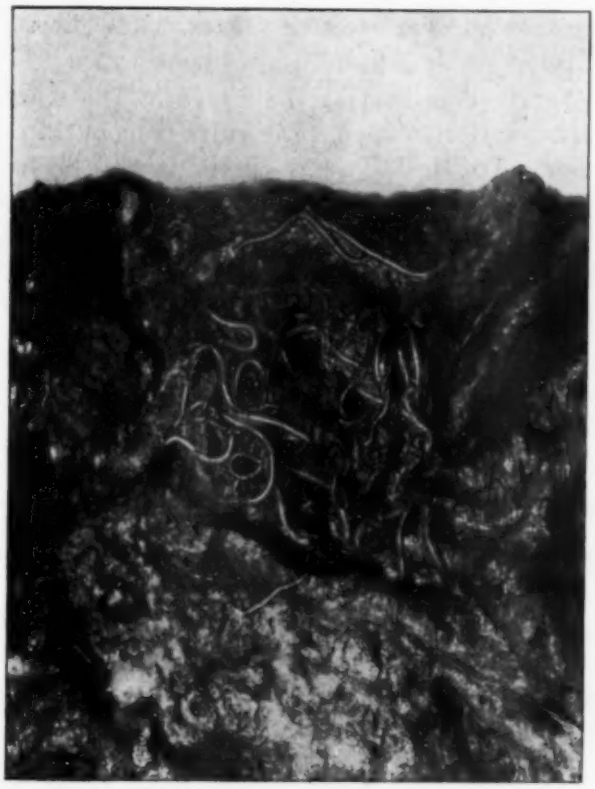

FIG. 7. Same as Fig. 6, magnified. From photograph.

at least (*T. tenuicollis*) being associated with and probably responsible for ulcers found in the mucosa of the colon of a horse examined post mortem at Lethbridge, Alberta, August 5. (Figs. 6, 7.) The same species was also associated with ulcers found in the colon of a horse at Regina, Saskatchewan, July 20 (Fig. 5). Except for the presence of the worms the ulcers are very similar in appearance to those observed in hog cholera. From the ulcer shown in Figs. 6, 7, twenty-five individuals of the species *T. tenui-*

collis were removed. The armature of the mouth capsule of the forms belonging in the genus *Triodontophorus* is rather formidable because of the presence of three well-developed blade-like teeth, and it seems quite likely that these teeth play an important part in the production of the ulcers with which the worms have been found associated.

Species *Triodontophorus serratus* (Looss, 1900) Looss, 1902.

Average length of male 18 mm, of female 25 mm. The mouth collar is slightly depressed at the margin. The margins of the capsule teeth are denticulated. The vulva is more than 2 mm from the posterior end of the body. The dorsal lobe of the male bursa is short. These few characters are taken from the more complete description given by Looss (1902). The species was not found among the horses examined in Canada in 1917. It has been recorded from Egypt, India, and England.

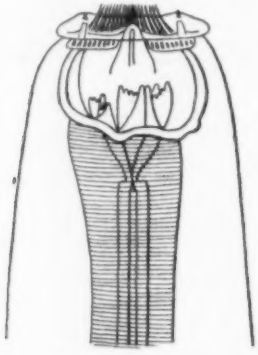

FIG. 8. *Triodontophorus serratus.* From Looss (modified). X104

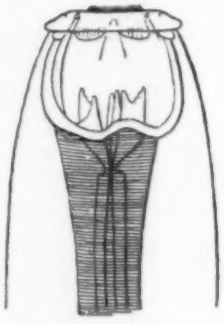

FIG. 9. *Triodontophorus minor.* From Looss (modified). X104

Species *Triodontophorus minor* (Looss, 1900) Looss, 1902.

Average length of male 13 mm, of female 14 mm. The mouth collar is depressed at the margin. The margins of the capsule teeth are only insignificantly denticulated. The vulva is about 0.7 mm from the tip of the tail. The dorsal lobe of the male bursa is long. These few characters are taken from the more complete description given by Looss (1902). The species was not found among the horses examined in Canada in 1917. It appears to have been recorded only from Egypt, having been found in one of 30 horses examined by Looss. Looss notes that it is remarkable for its habitat in the last, thickened portion of the large loop of the colon, all the

other species of horse strongyles observed by him having been found in the cecum and first third of the large loop of the colon.

Species *Triodontophorus intermedius* Sweet, 1909.

Length of male 14.5 to 15.5 mm, of female 16.5 to 18.7 mm. The mouth collar is circular in profile. The margins of the capsule teeth are denticulated. The vulva is 1.45 to 1.7 mm from the posterior end of the body. The dorsal lobe of the male bursa is short. These few characters are taken from the more complete description given by Boulenger (1916). *T. intermedius* has been recorded heretofore from Australia and England. It was collected at Saskatoon, Saskatchewan, July 14, Lethbridge, Alberta, August 5, and Rosthern, Saskatchewan, August 31.

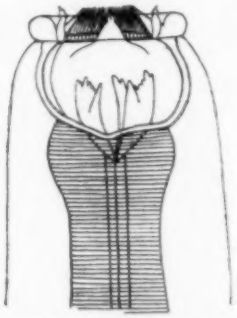

FIG. 10. *Triodontophorus intermedius.* From Boulenger (modified). X100

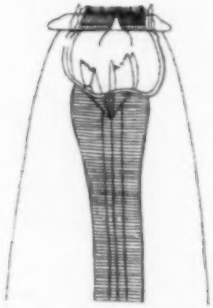

FIG. 11. *Triodontophorus tenuicollis.* From Boulenger (modified). X100

Species *Triodontophorus tenuicollis* Boulenger, 1916.

Length of male 13.5 to 19 mm, of female 16 to 19.5 mm. The mouth collar is depressed at the margin. The margins of the capsule teeth are denticulated. The vulva is 0.46 to 0.56 mm from the posterior end of the body. The dorsal lobe of the male bursa is short, sharply marked off from the lateral lobes. These few characters are taken from the more complete description given by Boulenger (1916). *T. tenuicollis* has been recorded heretofore from England. It was collected at Regina, Saskatchewan, July 20, and Lethbridge, Alberta, August 5, and is the species concerned in the production of the ulcers shown in figs. 6, 7.

Species *Triodontophorus brevicauda* Boulenger, 1916.

Length of male 13.5 to 14 mm, of female 16 to 17 mm. The mouth collar is high and erect, attaining its greatest breadth anteriorly. The margins of the capsule teeth are not denticulated.

The vulva is about 0.3 mm from the posterior end of the body. The dorsal lobe of the male bursa is long. These few characters are taken from the more complete description given by Boulenger (1916). *T. brevicauda* has been recorded heretofore from England. It was collected at Saskatoon, Saskatchewan, July 14, Lethbridge, Alberta, August 5, and Rosthern, Saskatchewan, August 31.

Genus *Gyalocephalus* Looss, 1900 (Type species, *G. capitatus* Looss, 1900).

Only one species of this genus is known.

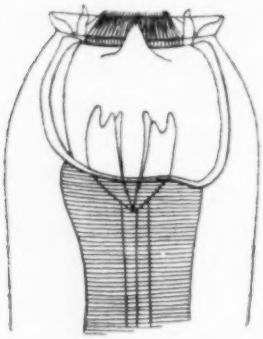

FIG. 12. *Triodontophorus brevicauda.* From Boulenger (modified). X100

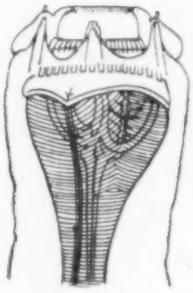

FIG. 13. *Gyalocephalus capitatus.* From Looss (modified). X104

Species *Gyalocephalus capitatus* Looss, 1900.

Length of male 7.5 mm, of female 9.5 mm. Leaves of anterior leaf crown very numerous, slender, pointed. Mouth capsule very short and relatively broad. No trace of a dorsal gutter. Anterior portion of esophagus very wide, middle portion slender. Oesophageal funnel almost hemispherical in shape, supported internally by apparently six strongly arched longitudinal ribs starting from the mouth capsule and converging posteriorly toward the commencement of the tri-radiate lumen of the esophagus. Vulva about 0.7 mm from the posterior end of the body. Prebursal papillae very long, form supporting rays of the male bursa. These few characters are taken from the more complete description given by Looss (1902). *G. capitatus* has been recorded heretofore from Egypt by Looss who collected a single pair of specimens from the colon of a mule, from France by Railliet and Henry (1902), and from England by Leiper (1910). It was collected at Lethbridge, Alberta, August 5, and Rosthern, Saskatchewan, August 31.

Genus *Cylicostomum* Railliet and Henry, 1902 (Type species *C. tetracanthum* [Mehlis, 1831]).

This genus, as constituted at present, contains a larger number of species than any other genus of horse strongyles, and the worms that belong to it are much smaller in size on the average than the worms of any of the other genera in question. These facts render specific determination as a rule more difficult than in the case of the other genera, especially since a considerable number of species is likely to be present in the same individual host. A study of each specimen under a high power microscope is usually necessary for a determination of its species. Following are the named species of *Cylicostomum* occurring in the horse and other equines:

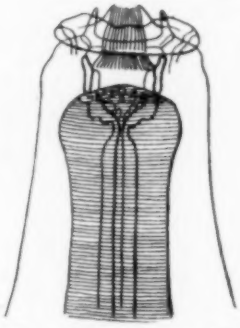

FIG. 14. *Cylicostomum labratum.* From Looss (modified). X190

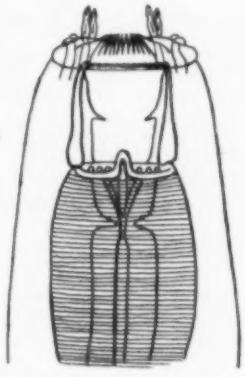

FIG. 15. *Cylicostomum poculatum.* From Looss (modified). X190

Cylicostomum tetracanthum (Mehlis, 1831), *C. labratum* (Looss, 1900), *C. labiatum* (Looss, 1902), *C. coronatum* (Looss, 1900), *C. bicoronatum* (Looss, 1900), *C. poculatum* (Looss, 1900), *C. calicatum* (Looss, 1900), *C. alveatum* (Looss, 1900), *C. catinatum* (Looss, 1900), *C. nassatum* (Looss, 1900), *C. radiatum* (Looss, 1900), *C. elongatum* (Looss, 1900), *C. auriculatum* (Looss, 1900), *C. mettami* (Leiper, 1913), *C. euproctus* (Boulenger, 1917), *C. insigne* (Boulenger, 1917), and *C. goldi* (Boulenger, 1917).

Altogether, so far as appears from the literature available, seventeen named species of *Cylicostomum* occur in the large intestine of the horse and other equines (mule and ass). As already noted some new species belonging to this genus were collected in Canada during 1917, but descriptions of these will be left for a future paper.

Most of the species of *Cylicostomum* thus far recorded as parasites of the horse measure in the adult stage less than 15 mm in length, several less or scarcely more than half this size. A prominent circular mouth collar is present surrounding the mouth opening, more or less distinctly set off from the rest of the body. The mouth collar is regularly rounded, slightly flattened or depressed, or (in one species) with its outer edge projecting forward. Inner surface of mouth collar occupied by the anterior or external leaf crown, consisting of narrow flattened leaf-like processes with pointed or rounded tips, ranging in different species from 8 to 42 in number. Mouth capsule sub-cylindrical in shape usually broader than long but may be longer than broad. Posterior or internal leaf crown comes off from inner surface of mouth capsule near its

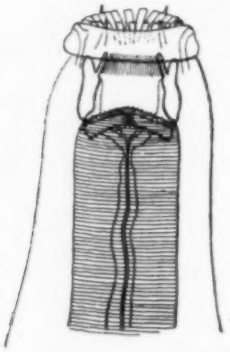

FIG. 16. *Cylicostomum coronatum.* From Looss (modified). X190

anterior border, and is composed of elements varying from small inconspicuous tubercles to long flattened leaf-like processes. Dorsal lobe of male bursa set off from the lateral lobes by a distinct notch. Dorsal rays of bursa large, split down or almost down to the roots of the externo-dorsal rays, each with two lateral branches of about the same size as the posterior portions of the rays themselves. Externo-dorsal rays closely approached to the postero-lateral rays, with their terminal portions turning off backwards more or less suddenly from their main course at an obtuse angle. Genital cone well developed, usually bluntly conical, but sometimes long and almost cylindrical. Spicules long and slender, equal in size, terminating posteriorly in a double hook, one branch of which bends sharply backwards. Vulva of female closely approached to the anus. The adult cylicostomes, according to

Looss, do not adhere to the mucous membrane, are not bloodsuckers, and feed upon the matter found in the contents of the intestine of the host, such as vegetable debris, the ciliates usually found in large numbers in the cecum and colon, nematode ova, etc. According to Railliet (1915) the immature stages of the cylicostomes occur encysted in the mucosa of the intestine.

From the material collected in Canada during the summer of 1917, besides some new species, twelve species of *Cylicostomum* have thus far been sorted out, namely, *C. labiatum*, *C. labratum*, *C. poculatum*, *C. catinatum*, *C. coronatum*, *C. bicoronatum*, *C. calicatum*, *C. radiatum*, *C. nassatum*, *C. elongatum*, *C. insigne*, and *C. goldi*. All of these were collected from the large intestine of horses examined post mortem at Lethbridge, Alberta, August 5, and Rosthern, Saskatchewan, August 31. *C. insigne* was found only in the Lethbridge horse; *C. elongatum* and *C. coronatum* only in the Rosthern horse; the others were present in both cases.

The writers are indebted to Mr. L. N. Garlough of the Zoological Division, Bureau of Animal Industry, for assistance in sorting out the specimens of the various species of *Cylicostomum* represented in the Canadian material, and to Dr. A. E. Cameron of the Entomological Branch, Ottawa, for assistance in field work.

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BLACKLEG AND ITS PREVENTION*

G. A. JOHNSON, Sioux City, Iowa

Blackleg is an acute infectious disease of cattle, known under a large number of different names. While other ruminants are not immune to the disease, it is not common among any of them.

Some authors state that swine sometimes suffer from blackleg, but we are inclined to believe this a mistake in diagnosis and that the supposed cases of blackleg in swine are some other form of emphysematosa, as there are several other conditions that are caused by other gas forming bacilli that more or less closely resemble true blackleg.

This opinion is based largely upon the fact that it is quite a common practice among farmers of many localities of this country to feed the carcasses of animals that have died of blackleg to their swine without producing a single case of blackleg in the swine, so far as we have been able to learn.

Blackleg and anthrax were considered one and the same disease until Bollinger, in 1875, and Feser, in 1876, demonstrated that they were two separate and distinct diseases, blackleg being due to the *Bacillus Chauveaui* and anthrax due to *Bacterium anthracis.*

*Presented at the 30th Annual Meeting of the Iowa Veterinary Association, Ames, Iowa, January, 1918.

Blackleg, to a certain extent, is a localized septicemia, somewhat similar in biologic principles to tetanus. It is usually characterized by local emphysematosa of the subcutaneous and muscular tissue, accompanied by septicemia. The period of incubation in natural infection is usually from 3 to 5 days and the disease usually runs a fatal course in from a few hours to three days.

Symptoms. In well defined cases there is loss of appetite, and cessation of rumination. The temperature does not give much information because it may be as high as 105, 106 or even 107 degrees F., while in other cases it does not go over 104 degrees F. Stiffness is an early symptom and in the majority of cases the animals manifest uneasiness by lying down and getting up, which is done with more and more difficulty as the disease progresses. In the majority of cases tumefaction in some part is present; especially in the later stages of the disease, the swelling is not very painful and usually presents the well known crackling sound upon manipulation, but in a typical case this may be absent. The history of the herd is of value in gaining a diagnosis, i. e., has there already been a loss indicating blackleg? Are the premises known to be infected with blackleg, etc.?

Post Mortem Lesions. As is well known this disease is characterized by a local emphysematosa of the striated musculature of some part of the body, as the shoulder or hip, with the formation of more or less gas. Upon excision there is usually found an exudation of dark or black bloody serum. Just underneath the skin the striated muscles present a more or less darkened or black color. There are usually small cavities filled with gas, giving the muscle a spongy feeling and appearance, and as a rule these parts do not contain an excess of moisture. However, there are cases where there is less gas and more exudation. But the diseased parts always present a very pronounced characteristic odor, described by some as sour-like, or like rancid butter, while others describe it as a sweetish, rancid smell, but not like rancid butter.

In typical cases there is little change in the visceral organs except the liver which is frequently affected by the formation of small ochre yellow centers ranging from 1/16 to ½ inch in diameter, and of dry-like consistency. But in a typical case we may find the musculature of any part affected, as the throat, one masseter muscle, etc., while in extreme cases the characteristic muscle changes appear to be absent. In such cases there are likely to be more or less

reddish patches on the serous membranes, frequently diphtheritic-like growths, especially on the pleura and pericardium. In these cases the visceral organs are likely to be engorged and more or less congested. It would appear that such cases might be termed generalized, while the ordinary case is usually localized and circumscribed. But owing to the fact that in some instances it assumes a rather generalized form, a post mortem of these atypical cases is not complete until all voluntary musculature of the body has been examined. The blood is always dark and firmly clotted, especially in the heart. This fact is of great assistance in differentiating blackleg from anthrax. Again there is little tendency in anthrax to the formation of emphysematous swelling, and also the lack of blackleg odor.

The distinguishing differences between blackleg and malignant edema are, the odor which is fetid in malignant edema and the very moist musculature. It should as a rule be easy to differentiate between blackleg and hemorrhagic septicemia, but an atypical or generalized case of blackleg might be mistaken for a case of cutaneous hemorrhagic septicemia and vice versa. But if we remember that in blackleg the emphysematosa is usually in the heavier muscles, while in hemorrhagic septicemia it is more in the dependent parts as the brisket, belly, etc., and that the fluid in hemorrhagic septicemia is more of a serous nature, usually containing less hemorrhage, we may be able to differentiate these conditions without the aid of a microscope. On the other hand it should be borne in mind that it is possible to have both these diseases in the same herd if not in the same animal, in which case it would be advisable to immunize against both diseases.

Shortly after the discovery of the causative agent, *Bacillus Chauveaui*, it was closely studied and an attenuated virus vaccine was produced, that was capable of producing more or less immunity in susceptible animals, and under variously modified processes large quantities of these vaccines have been produced and used from that time until now.

That these vaccines were of more or less merit and filled an important field is attested by the millions of doses that have been used. In fact they were the best and only remedy of merit on the market until recently. But as is always the case with attenuated viruses, the results have not always been what were desired.

The field experiences have demonstrated that in some instances

these vaccines kill a certain percentage of the calves vaccinated, while in others they do not protect for any length of time. In some instances herds were vaccinated four or five times in a year and still losses continued; especially has this been true of late years, when the available ranges and pastures have been over-crowded with stock, which has a tendency to increase exposure and consequently the prevalence of the disease.

NEWER VACCINES. Recently a new line of vaccines has been developed and placed upon the market so that it is not necessary now to rely upon the old time attenuated viruses. These newer vaccines are germ free and consist of aggressins, true and artificial, and blackleg anti-serum.

GERM FREE BLACKLEG VACCINE. The germ free blackleg vaccine is an aggressin. Briefly, it is prepared as follows: supposedly susceptible calves are inoculated with a virulent strain of pure blackleg virus and the disease allowed to run its natural course. The carcasses of such animals that die within forty-eight hours after inoculation are taken into the laboratory, properly prepared and inspected, and if found free from harmful invaders, the diseased tissues are removed, and the serum and juices from these diseased parts are collected and purified by filtrating processes, etc., so as to render the finished product absolutely sterile. The fact that the animal dies of blackleg within forty-eight hours after inoculation indicates that large quantities of toxins and antigens are produced.

In order to assure sterility of the product each serial lot is thoroughly tested by three separate and distinct processes, the fermentation tube test, the culture media test, and the guinea pig test. These tests are carried out according to the regulations prescribed by the Bureau of Animal Industry.

The product must stand each of these tests perfectly before it is offered for sale. It should also be tested on guinea pigs or calves for potency. Thus we have in the germ free vaccine an absolutely sterile product that contains all the products of virulent blackleg bacilli generated in the natural way. It is harmless, even in quantities twenty or more times the size of the regular dose. It requires handling the animal but once. It may be used on any sized or aged animal and under varied conditions, such as at time of branding, dehorning, castrating, etc. It will produce a lasting, if not a permanent immunity. However, it requires from five to ten days

to produce its full immunizing effect, during which time the animal may contract the disease.

More recently an artificial aggressin has been put upon the market under the name of blackleg filtrate. It is prepared by growing the blackleg bacilli on artificial media in the laboratory, and purifying by filtration, etc., but as this product is still in the experimental stage and some inoculation tests and field reports do not fully bear out the claims put forward for it, we prefer to reserve judgment pending more definite information.

BLACKLEG ANTI-SERUM. This is produced by hyper-immunizing horses by repeated injections of increasing doses of virulent blackleg virus. After hyper-immunization is complete, the blood is drawn, clarified, filtered, etc., and after being tested for purity and potency, is ready for use.

This serum has more or less curative value when used in the early stages of the disease, but the very nature of blackleg precludes successful medication in most cases, hence it is not advisable to build false hopes about a cure. Better play "Safety First" and vaccinate with the germ free vaccine before the herd becomes infected.

This serum is also used in conjunction with blackleg virus to produce immunity, but this does not appear advisable for three reasons:

1st. It does not produce as lasting immunity as does the germ free vaccine.

2nd. It is much more expensive and requires handling the animal twice.

3rd. Virus should never be used unless necessary, because of the danger of not only producing an occasional death, but also of contaminating the premises and thereby increasing infection and perhaps creating new centers of infection.

On the other hand, blackleg anti-serum has a place in a limited field and that is where a virulent type of blackleg has broken out in a herd of valuable cattle. Then it is advisable to give a large protective dose (30 to 60 c.c.) of serum. This should check further development of the disease within the herd, or render such animals as might develop the disease, within 24 hours to 48 hours after treatment, more amenable to curative serum treatment. Then to follow this protective dose of serum in about fifteen days by giving a regular dose (5 c.c.) of germ free blackleg vaccine. The reasons

for making the injection of the germ free vaccine approximately fifteen days after administering the serum may be briefly stated as follows: the serum and germ free vaccine are antagonistic, the one counteracting the other, hence if the vaccine is given before the serum has been largely eliminated (which apparently takes about 15 days) the one will counteract the other. On the other hand, if we wait too long after the effect of the serum has passed away, the disease may develop again. By this method the spread of the disease within the herd should be checked and a lasting immunity produced with a minimum loss of animals, with absolutely no danger of spreading or producing disease. A still better method, where conditions are favorable, is to take the temperature of all animals at time of treatment and such as show a temperature of 104 degrees F. or better, should be given a much larger dose (100 to 300 c.c.), according to indications. This method has been followed in several instances with very gratifying results. But it can be seen that it is rather expensive to be used in ordinary herds and can be followed only where conditions are reasonably favorable for handling the animals.

Another method of handling a herd already affected with blackleg is to administer the germ free vaccine in regular sized dosage, and keep very close watch of the herd for about ten days and should any of the animals present any symptoms of blackleg, immediately administer a curative dose (300 to 500 c.c.) of serum. This is not so certain, but may be cheaper than the first mentioned method.

In attempting to produce immunity by means of an attenuated virus, a materially different biological principle is involved than that involved where a germ free vaccine is used. Where an attenauted virus is used (it makes no difference whether it be blackleg, anthrax, smallpox or whatever disease) it is supposed to produce a mild or modified form of the disease, which stimulates the production of antibodies in the animal. This involves a number of vital points, the two most important of which are the proper attenuation of the virus, and the proper condition of the individual to be treated.

Regarding the virus, if it is attenuated too much, it will not produce any reaction (disease), whereas if it is not attenuated sufficiently it may produce so violent reaction as to prove fatal.

Regarding the condition of the individual, if its resistance to

the disease should be very low, it would suffer a strong reaction which might prove fatal, or if its resistance should be very high, the individual would suffer little or no reaction and hence acquire little or no immunity. But should the attenuation be just right and the individual in the proper condition, then the proper reaction or degree of disease will take place and more or less immunity be acquired. But being hedged in by so many uncontrollable factors, the strangest part is that there are not more failures. Another fact that should never be lost sight of is that every time any virus vaccine is used, the virus of the disease in question is being introduced on the premises, and until we know much more about biology we have no assurance that it may not result in harm. In other words, it should be considered dangerous. In using these virus vaccines in herds affected with blackleg, it is about the same as using virus alone in a cholera infected drove of swine. But when a germ free or sterile vaccine is properly administered, there is absolutely no danger of conveying any disease. The theory upon which germ free blackleg vaccine produces immunity, briefly stated, is that the antigens contained therein stimulate the production of antibodies in the individual, or in other words, it is the product of the germs that stimulate the production of the antibodies which render the animal immune.

ADMINISTRATION. The most essential point to be observed in administering germ free blackleg vaccine is cleanliness. Have clean, sterile syringes and needles, draw the vaccine direct from the container into the syringe, as there is always danger of contamination where it is turned from the original into any kind of container, and then drawn into the syringe. Disinfect the seat of injection with some good agent as tincture of iodine.

Intramuscular injections of germ free blackleg vaccine insure a little quicker absorption, but are more painful and upon the whole have little or no advantages over subcutaneous injection.

Blackleg serum should be injected intramuscularly, especially in case there is any localized swelling, when it should be injected in and about the swelling, not to exceed 30 c.c. in one place. Some have advocated intravenous injection, but as the serum is from a different species of animal, it may be slightly dangerous.

The following data procured from the owners of the cattle indicate the results that are being obtained with germ free blackleg vaccine:

No. Herds	No. Head	Year Vaccinated	No. died of Blackleg since vaccination 1st day	After 10 days
12	1887	1915	0	0
8	3320	1916	0	0
	25000	1917	5	0

Thus it will be seen that as far as we have any data the animals retain their immunity.

The most remarkable fact is that out of the several hundred thousand doses of the germ free blackleg vaccine that have been used this year there has not been a single animal reported lost from blackleg later than 8 days after vaccination, and but a very small fraction of 1% during the first eight days after vaccination, and all such loss was in herds where there had been losses from blackleg previous to the herd being vaccinated with the germ free blackleg vaccine, or in other words, in infected herds.

CONSERVATION SLAUGHTER*

W. W. Dimock, Ames, Iowa

By conservation slaughter is understood the slaughter of all animals that are in danger of death or deterioration from injuries and disease, or for various reasons are unprofitable, that their flesh may be utilized for food. Further, conservation slaughter should be carried out on all animals even though the flesh is unfit for human food; provided, (1) that they are suffering from any condition that is incurable, (2) that the time and expense make treatment unprofitable, (3) that during the time of sickness they expel from the body highly infectious material that contaminates the quarters and thus exposes other animals. All such animals are to be utilized as explained below.

The plan for conservation slaughter is to be carried out in connection with the general movement and necessity to conserve the food supply of the nation and to stimulate increased production. A few unprofitable animals in each herd and flock of the state make a total, the consideration of which is worthy of our most serious attention. Data at hand show that in the

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herds and flocks of Iowa there are many hundreds, even thousands of animals that are being kept at a very serious loss in these times of high feed costs. A few such animals in the past have had no appreciable effect upon the economic question of live stock production in Iowa, and largely so because of the great quantities of food stuffs that were available at a comparatively low price. At the present time, however, when we stop to consider the high cost of all food stuffs consumed by animals and the rapid increase in the retail price of all meat food products, it is forcibly brought to our attention that there is a great and unnecessary economic loss sustained from keeping among the flocks and herds of the state, animals sick in a way that makes them a source of danger to their fellows or that will finally result in their deterioration or death, or that are not up to a reasonable minimum production, or that are from any cause decidedly unprofitable. All are fully aware of the desirability of making provision for the most satisfactory disposal of such animals. Many of the animals coming under the class mentioned above may be disposed of for food purposes through the regular channels of sale. However, if any individual shows evidence of ill health, or is suffering from an injury or local disease, the sale price is very materially less than the actual value of the animals for food purposes, and again, the condition of the animal may be such as to make it impossible to ship any distance. In order that all animals still fit for human food may be utilized for such purposes, and the owner receive at least the approximate value for food purposes and thus in every way possible help to prevent loss and at the same time conserve the meat food supply, I believe that we should make every effort possible to handle them under what we may term "conservation slaughter".

Before attempting to handle animals that would naturally come within this field, it will be necessary to inform the owners and live stock dealers of the state concerning the purpose and necessity of starting a movement of this kind, and to give more or less specific directions to the owners and veterinarians of the state regarding the inspection of animals desirable to ship or to be handled locally under conservation slaughter.

In carrying out conservation slaughter at the present time I would propose that it be accomplished or undertaken, in general, in one of the three following ways:

First, that when possible all animals that are to be disposed of for purpose of conservation shall be shipped to a point having an abattoir that maintains federal inspection.

Second, that slaughter be carried out in connection with a local or municipal slaughter house, or on the farm, and the carcass inspected by a competent local veterinarian.

In cases where animals are slaughtered under the general plan suggested in connection with conservation slaughter, the inspection of the carcass should in all cases be performed according to the rules governing inspection as carried out by the meat inspection service of the Bureau of Animal Industry, United States Department of Agriculture. In case the meat from animals killed under the plan of conservation slaughter in local abattoirs or on the farm is to be offered for sale, the veterinarian making the inspection should be approved by the executive officer of the Animal Health Commission of the State of Iowa.

The classes of conditions for which the majority of animals so affected may with safety be used for food purposes under conservation slaughter are:

First. Accidental injury of healthy animals. For example, broken legs, wire cuts, hook wounds, or deep wounds from any cause, the location or nature of which makes recovery uncertain or unprofitable.

Second. Local diseased conditions or diseases that remain local throughout their course or that have little or no tendency, especially in the early stages, to become general in character and that have from experience been shown to be of no danger to the human when the flesh is used for food following removal and condemnation of the affected part or parts. For example, actinomycosis of cattle, caseous lymphadenitis of sheep, scirrhous cord of pigs, granular vaginitis of cattle, polyarthritis of pigs and many organic diseases.

Third. That class of diseases that are local and chronic in nature but tend to cause loss of condition in the animal, thus materially reducing its production and often finally terminating in death, either because of marked changes in the part affected or because of the frequency of secondary infection. For example, parasitic diseases where the parasites tend to localize in some particular organ or part, as nodular disease of sheep, echinococcus in the liver of the pig, pulmonary strongylosis, scabies, chronic or-

ganic diseases, paralysis of pigs, chronic local inflammations, tumors, etc.

Fourth. Systemic and constitutional diseases that do not in the early stages necessitate condemnation of the carcass, but that do upon becoming generalized render the carcass unfit for human food and necessitate total condemnation. For example, rachitis, sniffles or infectious rhinitis in pigs, tuberculosis, leukemia, anemia, and diseases of the nervous system.

Fifth. Those acute and chronic non-infectious diseases that not infrequently result in the death of the animal, such as a choke, urinary calculi, rupture, arthritis, acute indigestion, intestinal intussusception, etc.

Sixth. Those acute infectious conditions for which there is no cure and for which prevention is uncertain or inadvisable, the disease spreading more or less rapidly and often causing death of a large number in the herd or flock. For example, hog cholera, swine plague, hemorrhagic septicemia, stomatitis, foot and mouth disease, etc. The slaughter of animals to prevent their becoming infected in the case of an outbreak of an acute specific infectious disease in the herd or flock must be carried out with great care, and this applies particularly to those herds that are in a fattened condition and ready for market.

Seventh. Those animals that are economically unproductive, including non-breeders and unprofitable producers. For example, sheep, cattle and swine that fail to breed because of some malformation, or because of some diseased condition of the ovaries, uterus, or udder, or animals that have become non-breeders from any of the various complications associated with infectious abortion. Many such animals can be recognized upon a thorough physical examination. Examples of unprofitable producers other than for breeding purposes are to be found in cows that are being kept for dairy purposes, and animals for fattening purposes that fail to make proper gains because of type or constitutional condition.

The great importance of the object to be obtained from the carrying out of conservation slaughter is further supplemented by the saving of stable room, time spent in care, and feed stuffs that sick and unprofitable animals consume without making any gain in flesh, or producing in a way that makes them profitable. Many of the sick animals will finally die, resulting in almost a total loss of both the animal and the food that had been consumed.

In the Service and Regulatory Announcements published by the Bureau of Animal Industry, United States Department of Agriculture, are found in the last few numbers many items dealing with the conservation of meat products as being carried on by the Federal Meat Inspection Service. In the issue of October 20, 1917, is found as follows:

"For the purpose of promoting the conservation of meats and products the bureau's conservation committee visited a number of representative plants, conferred with the proprietors and operators of official establishments, and studied operations and procedures to see how such conservation might be promoted consistent with approved meat inspection methods."

As a result of the above, they report on the following phases of conservation:

LEAN MEAT. All careless and inefficient trimming of pork cuts, and the unnecessary loss of particles of lean meat left on the fat trimmings are to be avoided as much as possible. This lean meat has little value as fat but a maximum value as meat for food.

FATS. The committee recommends that where possible, all fats should be so handled as to conserve them for food purposes, that is, that no edible fats shall be permitted to become inedible through failure to properly handle them.

CANNING OPERATIONS. That all canned products shall be inspected immediately after filling. All leaky cans to be soldered and resterilized within the time prescribed by the regulations (6 hours) so as to prevent their spoiling and thus conserve the contents for food purposes.

CURED MEATS. It is suggested that every establishment do everything possible so that losses from curing may be reduced or entirely prevented.

Other suggestions made were that great care should be taken in connection with the proper handling of meats so as to prevent their becoming soiled, and spoiling from lack of proper refrigeration, especially in connection with transportation; also to avoid packing of meats in unsuitable containers for shipping.

There is also a note on the rough handling of live stock suggesting that the managers of slaughter houses and stock yards prevent, so far as possible, the rough handling of live stock, thus reducing the number of bruises, this entailing a loss since bruised meat has a value for tankage only.

In the Service and Regulatory Announcements for October 11, 1917, there is a statement on the use, preparation and handling of meat passed for sterilization. In the past, our inspection service has in the main recognized only two classes, and as a rule the establishments have been prepared to handle only the two classes, these being "U. S. Inspected and Passed", or passed unconditionally, and "U. S. Inspected and Condemned" as unfit for food. At the present time the Bureau (Meat Inspection Service) is recommending that certain meats be passed for sterilization (U. S. Inspected and Passed for Sterilization) providing the establishment has facilities for properly sterilizing the meat, the rule being, that it shall be heated to a temperature not lower than 170° F. for a period of not less than 30 minutes and that the product shall be prepared and marketed according to the requirements of the Bureau.

In the Service and Regulatory Announcements for July 3, 1917, under the heading, "Conservation of Meat Food Supply", is given a full statement regarding the purpose, object, and necessity for the conservation of meat. It is believed that conservation of a material nature can be accomplished without surrendering the purpose for which inspection is maintained.

Since the government, through its Federal Meat Inspection Service, in cooperation with the abattoirs of the country, is doing all in its power to conserve the meat products of the country, it would seem that the state, county, town, municipality, and the farmer should take an active part in attempting to bring about conservation, and that the state and its representatives that are in a position to do so should furnish the farmer, live stock owners, and the veterinarian with the information necessary to accomplish this without in any way endangering the live stock interests as a whole or the health of the consuming public.

SUPPLEMENTARY—CONSERVATION OF HIDES, FATS, AND BY-PRODUCTS. Considering the great importance and almost vital necessity of fats as used in connection with the war, provision should be made for the utilization of all animals that die or are killed because of sickness from a condition that renders their flesh unfit for human consumption, through arrangements to save the hide, render the carcass to obtain the fat, and prepare the refuse for tankage or fertilizer. During the last few years, in many of the large and small towns and cities of the state, rendering establish-

ments have sprung up and are doing a profitable business. However, there is room for the introduction of many other such establishments. These establishments, in my opinion, should be licensed and every stockman in the country should be informed regarding the advantage of having the men connected with these rendering plants call for all dead or dying animals, that the carcass may be salvaged. I further believe that the state, through its Animal Health Commission, should supervise the type of conveyance by which dead animals or diseased animal tissue may be transported from the farm to the rendering establishment, and also supervise the general sanitary condition of the establishment itself. Personally, I can see no reason why, for the present at least, pigs dying of cholera or animals of hemorrhagic septicemia, and from most of the other infectious diseases could not with safety, if carried in a properly constructed tank, be transported from the farm to the rendering establishment and utilized for grease and tankage. Pigs dying from hog cholera are utilized for such purposes where the carcass can be used without being transported from one point to another.

Discussion

Dr. K. W. Stouder: This subject of "Conservation Slaughter" is indeed a timely and very practical one for discussion. We are told that fats are very essential to the conduct of war, and yet it is easy to compute that in hog losses alone, Iowa in one year, when disease was not particularly prevalent among our swine, saw more than 1200 tons of fat absolutely wasted, and this is estimating that each hog carcass would have yielded only 10 lbs. of fat. If these fats were worth 10 cents per pound, which is easily below the present market for inedible grease, we have lost about a quarter of a million dollars in hog fats, to say nothing of the proteins which would be by-products of the rendering and exceedingly valuable hog feeds, and worth at least another $100,000 or more, at present prices.

Our Extension and Veterinary Investigation Departments have had reports from practically all parts of Iowa showing heavy losses at times among other classes of live stock, particularly hemorrhagic septicemia among cattle. In some of these cases because of fear on the part of the owner not even the hides are saved, much less the carcass fats and by-products, yet a well organized rendering service could have saved labor, fats and glycerine, and lessened the spread of infection. Modern invention has improved methods and increased savings materially in all branches of business, and

we must soon expect to see the truck with tank constructed box going out over areas of country collecting the carcasses of animals for rendering, for they are proving practical where used already. It occurs to many of us that adoption of such a system should be speeded up, and the plan extended and perfected so that not only the dead carcasses may be salvaged, but that the unprofitable animal, the accidentally injured, and the chronically sick but still partially valuable animals may be easily and cheaply disposed of under a system which utilizes their complete value, and yet most certainly protects the consuming public as well as the surrounding live stock from disease exposure.

These possible economies are well known to every veterinarian. Few others are informed regarding their extent and it is your duty to your country to see that these savings of fats are made in your community just as far as possible. The furtherance of such plans by assisting capable and experienced rendering concerns to find suitable locations, the education of the stock owner to utilize such plants and service, and the posting of ourselves upon the subject of meat inspection until we can give good advice as to the salvage in a carcass fit for human food, can be one of our contributions to the welfare of our country at this time.

DR. CHAS. MURRAY: There are two forms of conservation discussed by Dr. Dimock which impress me as deserving of emphasis, viz.: emergency slaughter of animals on the farm and utilization of fats from animals dead through accident or disease. In the work of our department, we are frequently called upon by correspondence to render a decision as to the advisability of making some use of animals destroyed or dead of disease. These requests come mainly from the laity and the increase in numbers of such inquiries leads me to conclude that they are ready to do their part in conservation of such material. Samples of meat are frequently received with a request that they be examined to determine their suitability for food. These samples come from fat animals that have choked, frozen parts of their bodies, or met with accidents that render them unable to get around, etc. We are in poor position to render a decision except from the history given, for the parts sent are invariably muscle from a part of the body entirely removed from that affected by the injurious agent. Here, it seems to me, is the opportunity for the local veterinarian. He is in a position to inspect the carcass and to make an intelligent decision in the matter. He is in position to encourage his clients to make use of such material as is fit for food, and the client can well afford to pay him liberally for his time and services.

There is an increasing sentiment among stock men to utilize the carcasses of animals for food for hogs or for the fat. I believe every farmer can well afford, in case he does not have the advantage of a collection system for dead animals, to construct a crude,

low priced rendering plant where he can render out the fats to be sold at a remunerative price, and cook the fleshy part of the carcass for food for his remaining animals. The price realized from the sale of the fat will pay well for the time and labor necessary for cooking the carcass, and the fact that when the process is completed the carcass has been satisfactorily and safely disposed of ought to be of additional value in that sanitation is thus properly preserved.

DR. J. I. GIBSON: I have been interested in this paper because I have been giving the subject serious consideration. I believe conditions and circumstances as they now exist make it the duty of all owners of breeding animals to keep only such animals as are proven breeders, of course, including young animals which are most certain to prove breeders. I believe it is the duty of all owners at this time to sacrifice such animals as have proven barren and to keep in their places sure breeders or young animals to be tried out as breeders. The cattle men (breeders of pure-bred cattle) have always carried in their herds animals favored on account of their blood lines that will not breed and are, therefore, a bill of expense and are not proper animals to sell to any purchaser other than the packer or butcher. With the increased demand for meat all such barren animals should be sent to slaughter, thereby increasing the meat supply and conserving the feed heretofore consumed by the barren animals that are entirely worthless from the breeder's standpoint. I believe every farmer in Iowa should increase his breeding herds of cattle, sheep and swine, and that no more worthless, barren animals should be carried from year to year in our breeding herds.

I am also interested in the supplementary part of Dr. Dimock's paper on the conservation of hides, fats and by-products of our dead animals. I figure the hides, fats and by-products of the dead animals in Iowa properly conserved will bring to our people about $10,000,000 a year. From what information I can gather only about 10 per cent of these valuable products is conserved by the rendering plants now in operation in the state. About half of the value of these carcasses is represented in the fats, the balance in the hides, tankage, fertilizer, and by-products. These commercial fats now bring about $15.00 per hundred.

The fats contain a percentage of glycerine which varies from 4 to 12 per cent and would average 6 per cent glycerine. Glycerine is worth from 75 cents to $1.00 per pound and is liable to continue to rise in price, especially during the existence of the war. Glycerine is the real cause of the present high price of all fats. Glycerine is used in the manufacture of explosives, therefore, no argument should be necessary to convince the people of the state and nation that all fats carrying a percentage of glycerine should be conserved and the glycerine extracted, lest there come a time in

this great world struggle between autocracy and democracy when there might not be sufficient glycerine available to the United States and our allies for the manufacture of sufficient explosives to destroy the Hun or drive him back across the Rhine. Any laws existing upon our statute books that require the burning or burial of the valuable animal carcasses should be disregarded by the War Department, and an order should be issued commanding the people of this and all other states to conserve all fats from animal carcasses, in order that the glycerine might be extracted therefrom and an ample supply of this valuable product conserved for the purpose of administering a sound threshing to the Teuton armies. The scarcer the supply of glycerine the higher the price will be of all these fats. I estimate an annual waste of 20,000 tons of non-edible fats and grease in the State of Iowa, which I believe should be conserved and could be saved without interfering with the sanitary work of the state in the control and prevention of the spread of diseases of live stock. The rendering process will sterilize the products and thereby render them harmless. I therefore hope to see some action taken by the War Department calling for the conservation of all animal fats.

PROBLEMS OF TICK ERADICATION

Personal Influence of the Inspector

DR. W. H. DALRYMPLE
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(The following is an abstract of a highly instructive address delivered by Dr. Dalrymple at the conference of Bureau inspectors engaged in tick eradication work held at New Orleans, Louisiana, January 15-18, 1918.)

THE MAN IN AUTHORITY. One of the most desirable and valuable qualifications in the man with authority is first of all an accurate knowledge of the work over which he presides and the gift of being able to handle other men satisfactorily. Although a man may be a master in the details of his work, yet if he is lacking in the personality and tact necessary to success his manner is more liable to repel than attract people to him, with the resultant lack of cooperation afforded him and consequent hindrance to the accomplishment of the ends desired.

It is generally conceded that the greatest obstacle to the most successful prosecution of veterinary sanitary work, in which may

be included tick eradication, is the gross ignorance of the people as to the procedure and the ultimate result sought. Antagonism is displayed despite the fact that the work is carried on for their individual benefit and that of the community and state in which they live. And yet, without some effort being consistently and continuously exerted to dispel such ignorance, final success must of necessity be considerably delayed. Hence in this particular phase of the work success depends largely upon the men in authority being endowed with personal magnetism and tactfulness.

(Dr. Dalrymple at this point related several entertaining instances in his early work as a veterinary inspector in Ireland in connection with contagious pleuro-pneumonia. These reminiscences illustrated very forcibly the value and importance of tolerance and tactfulness in inspiring confidence in the people, and securing their good-will and cooperation.)

Obstacles to Tick Eradication. Anyone who has been in touch with tick eradication since the beginning of the campaign knows the trials and tribulations through which he has had to pass and the many obstacles which have incessantly confronted him. While many of these have been overcome there still exist, and will to the end, those of a similar character which must be tackled.

In mentioning a few of these obstacles I think we may give ignorance, which might be extended to gross all-around ignorance on the part of the laity, the very first place. Ignorance concerning the true object to be attained; ignorance regarding the fever tick and its life habits; ignorance concerning the methods of procedure for the destruction of the parasite and the fever with it; and ignorance as to the value of the work to the individual cattle owner, etc.

It appears to me, that with an average amount of tact, and a little more condescension, if you will, a great deal of this ignorance might be dispelled by a little man-to-man and heart-to-heart talk concerning the various phases of the problem. In other words letting in the true light to the darkened understandings, for the normal individual, even with the densest sort of comprehension, may be made to see and understand if only the problem is clearly explained to him and more particularly if it is done in a tactful way and in a manner which appeals to the man, arouses his interest, and gains his confidence, friendship, and good-will.

True, suspicion is a dominant factor with many of these people. This, too, is born of ignorance, through erroneous information proffered by similarly ignorant or suspicious individuals. Once ignorance is dispelled, suspicion also will gradually vanish.

The lack of cooperation is a tremendous obstacle in the prosecution of this important work; and where are we to place the cause for this want of sympathy, if not in the ignorance of so many of our people? Cooperation suggests correct understanding and enthusiasm; and once the people get understanding through enlightenment, cooperation is bound to follow. It cannot be otherwise; a man may be ignorant, but that is no indication of his being a fool, to his own detriment, if once he sees the light.

Selfish Objectors. There is another class of people who, although they may not be wholly ignorant of conditions, yet for selfish personal reasons frequently obstruct the progress of tick eradication. I refer to the man with cattle but with insufficient or no pasture of his own and depending for the sustenance of his cattle upon free range or the generosity of his neighbor. This man fears a stock law which he considers would interfere with his business, and for purely personal reasons he has no sympathy with the work and blatantly calls out for "personal liberty", which he seems to interpret as the right to selfishly benefit himself at the expense of his neighbor and everybody around him. Then we have the unpatriotic citizen who seems to object to contribute his due share to taxation through legitimate assessment of his cattle, which he believes the work of tick eradication would force him to do. We are all familiar with these obstructionists, and time will, of course, eventually straighten them out through the general enactment and enforcement of suitable legislation. This desirable result, however, may be very materially assisted by accurate information judiciously and tactfully imparted to the people themselves.

There is another class of obstructionist who bobs up periodically and who, unfortunately, is rather effective in his methods. I refer to the little politician with some petty political office in view. This man carefully feels the pulse of his community regarding the tick eradication question, and if he finds that ignorance prevails and consequently an aversion to the work, he loses no opportunity to add to this ignorance and to strengthen the people in their spirit of aversion. He simply plays upon the credulity of the uninformed, so that he may successfully ride into office through their votes.

This class of citizen usually knows better, but his campaign is conducted in an absolutely selfish manner, without any regard whatever for the real good of his neighbors or for the successful development of his community or of his state. He is a dangerous man, however, because through his sophomoric campaign talks and speeches he is frequently able to sway the minds of the people, and in some instances the minds of the local authorities in the county, whose assistance and cooperation are so much needed to successfully carry on the work, by posing as the "friend of the poor farmer" against imaginary governmental aggression.

Even in a case of this kind there is a remedy. The "toxin" of ignorance must be carefully combated by the judicious use of the "antitoxin" of knowledge. In other words our poorly informed people must be educated, so that they may be able to think intelligently for themselves and base their conclusions upon proved facts.

SUMMARY. As this whole matter appears to me, it would seem to resolve itself into two main issues, viz.:

1. The fact that great ignorance still prevails concerning the work of tick eradication, and which must of necessity be dispelled before we may hope to reach the goal of tick-freedom in the shortest possible time; and

2. That the only feasible method to accomplish this, as I see it, is through the education of the people; which I believe will largely devolve upon the county inspector, who is presumed to come into daily contact with the cattle owners in his immediate locality.

This would suggest, therefore, that the inspector must not only be familiar with every phase of the work, but he should be an educator—shall I say of the kindergarden type? because it should be remembered that his "pupils" are but babies in knowledge of the problem he is trying to solve. He should be patient, tolerant, and sympathetic, but withal he should be firm, and he should be a student of human nature, so that he may draw the people to him through being able to adapt himself to their various idiosyncracies, their peculiarities of temperament, etc.

Education, therefore, is the surest weapon we possess with which to bring the tick fight to a "peaceful issue" in the shortest time possible, because it will bring with it all other measures necessary to accomplish the final result.

I fully realize, of course, the magnificent work that has already

been done in the face of all the obstacles mentioned, and no doubt others which I have failed to allude to. There is a great deal yet to be accomplished, and there is still an immense amount of gross ignorance, and what I have said is more in the nature of an appeal to those who expect to be in the fight during the remainder of the campaign.

Finally, we must always bear in mind that this country is at grips with the most powerful (military) and relentless foe which possibly the world has ever known, in the greatest conflict of which there is any record in history, and on the outcome of which depend momentous consequences. Therefore, everything that it is possible to do to conserve and increase the food supply in meat and meat-food products at this time of stress, and for some time in the future, should be done, not alone from the standpoint of patriotism but as an absolute necessity, in fact a war measure. I am of the opinion that the successful early completion of the work of tick eradication in the South will be one of the most potent factors in aiding our country and our associates in the war to decide the conflict favorably.

MAKE YOUR MONEY FIGHT.

—Under Federal supervision there were dipped in Louisiana during the month of March about two hundred thousand cattle. There were constructed during the month 813 dipping vats although the state-wide law, governing the work of tick eradication, did not become operative until April 1. There are now 3478 vats in operation in the state.

—Announcement is made of the marriage of Miss Mabel E. Williams to Dr. Edward F. Sanford, New York City, February 14.

—A Cornell Veterinarians' Club was recently organized at New York City with a membership of nineteen. Dr. Cassius Way was elected president, C. V. Noback, vice president; L. Price, secretary-treasurer.

—The following-named veterinarians have been added to the force engaged in hog cholera work in the State of Illinois with headquarters at Springfield, Illinois: Drs. Howard L. Deuell, Theodore M. Bayler, Albert M. Meade and Grant B. Munger.

—LIBERTY LOANS STRENGTHEN THE LIBERTY LINE.

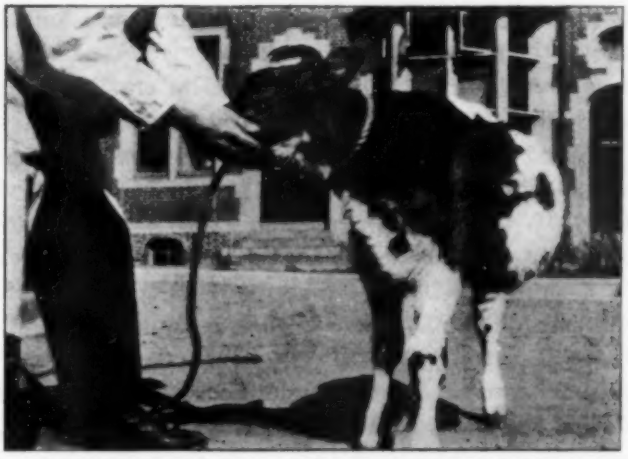
CLINICAL AND CASE REPORTS

DIAPHRAGMATIC INTERCOSTAL RUMENOCELE IN A CALF

WALTER J. CROCKER, Philadelphia, Pa.

From the time of birth until destroyed the calf in the illustration manifested a swelling which occupied almost the entire side of the body. It varied in size from a lump as big as a man's fist to a small tub. At times it entirely disappeared. On palpation it sometimes presented the consistency of mush, at other times it felt like a balloon.

The animal was destroyed and autopsied immediately. The diaphragm was displaced forward and adhered to the thoracic wall



on the left side for a distance of six inches. A slit-like opening, 15 cm. long, appeared in the diaphragm and last intercostal space and showed white fibrous margins. A large portion of the rumen passed through this opening in the diaphragm and intercostal muscle into the subcutaneous tissue forcing it together with the skin outward to the formation of a large sac. The rumen in the sac contained gas and soft food material. The rumen was not adhered to the subcutis but was easily forced back into the abdomen. No evidences of strangulation were present. In this case the hernial ring was constituted of a congenital opening in the diaphragm and last left intercostal space. The hernial sac was formed by the subcutis

and skin. The hernial contents consisted of a portion of the rumen. Thus the pathologic anatomical designation diaphragmatic intercostal rumenocele.

Other organs and tissues presented no alteration.

OBSERVATION ON TREMBLES (MILK SICK) IN COWS, TRANSMITTED TO MAN BY MILK AND MILK PRODUCTS

H. R. SCHWARZE
Bacteriologist, Department of Agriculture, Springfield, Ill.

On May 29th, 1917, a report was received by the State Veterinarian in Department of Agriculture, Division of Animal Industry and Veterinary Science, from Mr. O. S. H., Atwood, Ill., stating that he had a sick cow on his farm, located two and one-half miles northwest from town.

The local veterinarian had been called to treat the case. On making an examination they were unable to make a positive diagnosis, but thought it might be some form of indigestion and treated the animal accordingly.

Mr. O. S. H. further stated that his son became ill about the same time the cow first showed sickness. The son was taken to St. Mary's Hospital at Decatur for treatment and died after several days' illness. The physician attending the son thought he was suffering from some plant poisoning.

That being the case, Mr. O. S. H. thought the boy might have contracted the disease from the cow and would like to have the Department make an investigation.

On the 30th day of May I proceeded to Atwood to investigate the trouble existing on the farm owned by Mr. O. S. H. On my arrival at Atwood, I called on the local veterinarian who was in attendance on the case, and the two of us went out to the farm to see the sick cow. We arrived at the farm about one o'clock. When we went to the barn we found the cow had died a short time before our arrival.

The history of the case, according to the owner, was that this Jersey cow, aged 4 years, giving a good flow of milk, had been kept in a clean, warm barn all winter and spring up to May 1st, during which time she had received nothing but dry food. On May 1st,

he turned her out to pasture. On the 20th day of May, the cow began to show stiffness and her flow of milk dropped from three gallons normal to one and one-half pint.

The local veterinarian was called the same evening to see the cow. The symptoms described by the veterinarian in charge were, drooping of head and ears, stiffness, irregular gait, dullness, irregular pulse, respiration slow, temperature about normal, drank water freely, slight appetite, cessation of rumination, eyes glazed, membranes congested, bad-smelling breath and constipation. The diagnosis made by him was some digestive trouble, and the patient was treated accordingly with laxatives and stimulants.

However, the animal did not improve, but seemed to be on the decline with all the former symptoms more marked. On the third day she preferred the recumbent position to standing up. When made to rise she would get up with difficulty, trembling of entire muscular system would take place. Walk was very irregular, general stiffness. When leaving her alone she would again take the recumbent position and the trembling would stop.

Whenever the animal was disturbed and excited the former symptoms would present themselves. As time went on the symptoms became more aggravated until she was unable to rise, with absence of normal reflex, gradually going into coma, followed by death on the ninth day.

On post mortem examination we found the body still warm with rigor mortis complete. The skin appeared quite smooth, the eyes appeared glassy and mucous membranes showed congestion; membranes of mouth and tongue normal. When opening the body a peculiar acidulous odor was detected, the blood was tarry black in color, did not coagulate but rather jellied, lungs and heart normal. The gastro-intestinal mucosa seemed to be slightly congested with the exception of the abomasum. The mucosa of this organ was greatly congested. The contents of the stomach and bowels seemed to be drier and harder than normal with the exception of the abomasum. The contents of the stomach were more liquid than normal (no doubt due to the various drenches the cow had received.) The liver was slightly enlarged, showing fatty degeneration; spleen and kidneys normal; bladder contained an abnormally large amount of urine. The urine had a very strong acidulous odor, yellow in color, specific gravity 1025, acid reaction.

In connection with the sickness of this cow, the son of Mr. O.

S. H. became ill on the seventh day of May, 1917. Their local physician was called the 20th to treat the boy. However, the trouble did not respond to the treatment, but his condition was growing more serious. Consequently they took him to St. Mary's Hospital at Decatur for treatment. On investigation it was found that the boy consumed a great deal of milk, which was taken from the cow before any symptoms were noticed. In fact, the father stated that milk was the boy's principal diet.

The boy's symptoms, as described by his father, were similar to the ones manifested in the cow. Glassy appearance of the eyes, congestion of mucous membranes, dullness, nausea, vomiting, stiffness and constipation.

On the 26th day of May, 1917, Mr. H. P. H., who lives across the road from his brother, O. S. H., became ill. The same physicians were called to treat him. He was treated at home and not taken to a hospital like the former patient. We went over to see Mr. H. P. H., but were not allowed to go in the room with him. We talked to Mrs. H. P. H. about the case, and the symptoms she described were that he was very weak, listless, complained of stiffness, nausea and vomiting spells, breath had a bad odor, and a peculiar appearance of the eyes.

When asked whether Mr. H. P. H. consumed much milk before he became ill, she said that he did not consume any, but that he was fond of cream, home-made cheese and butter of which he had consumed considerable.

The milk products that were consumed by Mr. H. P. H. were made of milk taken from two cows that did not show any symptoms of trembles. However, they were kept in a pasture adjoining the one where Mr. O. S. H. pastured his cow.

These two cows were taken from their pasture as soon as the trouble was suspected.

The symptoms described by the physicians in charge of the boy were, the patient complained of stiffness of the back, a foul-smelling breath, constant vomiting, no rise in temperature, obstinate constipation, pupils dilated, conjunctiva congested, knee jerks were present but gradually became absent. The Babinski sign was always marked, a lumbar puncture was made, the Nonne Apelt test applied with negative reaction. Urine gave a marked acetone reaction. He refused all food, gradually became weaker, went into coma and died the tenth day.

The symptoms manifested by Mr. H. P. H. were the same as the former. However, no lumbar puncture was made and Nonne Apelt test applied. Mr. H. P. H. recovered after a long siege of illness.

It was further found that there had been a previous case of trembles on this farm. In the year 1915 there was a sick cow on this farm, which showed the same symptoms recognized in Mr. O. S. H.'s cow. This cow died. She was owned by Mr. O. S. H., who also became affected and died. Also his child became affected but recovered after a long illness.

The milk and carcass of the cow were fed to hogs. These also developed the disease and died.

The pastures where these animals were kept was a twenty-acre timber tract, divided in two ten-acre lots by a wire fence. One lot was used by Mr. O. S. H. for his cow, the other by Mr. H. P. H. for his two cows. The lay of the land was flat with a swail in the north center which was divided by the fence so that each pasture had about the same amount of low land. There was no domestic grass of any kind present. However, there was a large crop of weeds, such as low larkspur, mandrake, buch brush, burdock, iron weed, poke berry, Indian turnip, poison ivy, horse weed and a number of other plants I was unable to identify.

The interesting feature of these cases, to the writer, is that the same symptoms were manifested by all of the patients.

FALSE PREGNANCY; PULMONARY DRENCH; TUMOR ON OVIDUCT*

T. H. Agnew, Pasadena, California

False pregnancy in four goats of a herd of thirty. These goats were bred and were with kid to all appearances. At the termination of pregnancy, labor pains developed, the water bag burst, but no kids were present. They regained their normal condition in seven to nine days, and are again bred and now believed to be from two to four months pregnant.

Called to a cow about 2:30 P. M. She did not appear well that morning. The owner, an experienced cow man, gave her a dose

*Presented to the Los Angeles Veterinary Medical Association at its February meeting.

of salts, without any apparent discomfort to her at the time. Upon examining her, found pulse 80, temperature 94, tongue protruding, and breathing very short. She died in four hours, and the post mortem revealed the fact that the dose of salts had passed into the lungs.

Cocker bitch, four years old, has had five or six attacks within a year of what seemed like colic. When examined, by palpation of the abdomen, found what seemed to be an enlarged ovary. Decided to operate. On opening abdomen, found attached to Fallopian tube a three-sided tumor, about two and one-half inches long, resembling a Brazil nut in shape, quite hard and enclosed in a cyst. This was removed and the bitch has had no further attacks of pain, several months having elapsed since the operation.

"A PECULIAR CASE OF LAMENESS"

ERNEST F. JARDINE
Basseterre, St. Kitts, B. W. I.

Sometime in the month of September I was called to see a lame mare. The animal was supposed to be about 5 months with foal. Had been lame about 4 days and thought it was due to the shoeing so animal was taken to the shoeing smith. Nothing was found in the hoof to reveal the cause. Shoes were replaced. Then had the animal led out of the stable, which had a decline, to the ground.

Mare walked perfectly well out of the stable, also along the ground when led, backed all right. I searched the hoof and found nothing. In fact, I told the owner the animal was not lame. He then said, she is all right like that, but trot her and she goes rather funny. I then had the mare trotted, and the animal, instead of placing the left hind leg on the ground at all, held it up in the air the same way as a dog does when he has anything wrong with his leg.

It wasn't a fracture, it wasn't a nail or anything in the hoof; manipulating the limb from the external angle of the ilium, along the sacral region, etc., to the hoof, the animal showed not the slightest sign of any pain. Naturally the owner wanted to know, not so much, he said, as to what was the matter with her, as he was to know whether she would get right or not. I was at a loss as to what to say, but told him I thought the trouble was in the crural

muscles, and about a month's rest would help her. I advised warm fomentations to the crural region morning and night for one-half hour at a time, and prescribed a stimulating liniment of ammonia, turpentine, tincture of arnica and soft soap and water, to be rubbed in after fomenting.

I saw the owner about six weeks later and he told me the mare was all right again. Whether the treatment, or nature, effected the cure, or whether the trouble was really in the crural muscles or not, I will not venture to say.

SUCCESSFUL TREATMENT OF TETANUS

MAJOR FRED FOSTER
Post Veterinary Hospital, Fort Sam Houston, Texas

For the treatment of tetanus, attention is invited to a recipe given herewith that has proved successful in an experiment by Capt. W. W. Richards, V.C., N.A., and First Lieut. Asa R. Andrews, V.C., N.A., in a test made at the Post Veterinary Hospital, Fort Sam Houston, Texas.

One mule, weight 1000 lbs., admitted to the hospital February 19th, 1918, with a well developed case of tetanus; rigid condition of the ears; elevated condition of the tail, the whole musculature involved; marked condition of the membrana nictitans on the least excitement; was able to open mouth sufficiently to prehend and masticate food. The following treatment was used:

Placed in a comfortable box stall, loose, put on a bran mash diet, drinking water *ad libitum*.

February 19th, intravenous injection of 4 ozs. 3% solution sulph. magnesium.

February 20th, 6 ozs. 3% sol. sulph. magnesium.

February 21st, 8 ozs. 3% sol. sulph. magnesium.

February 22nd, 8 ozs. 3% sol. sulph. magnesium.

February 23rd, no medication.

February 24th, 8 ozs. 3% sol. sulph. magnesium.

February 25th, no medication.

February 26th, 8 ozs. 3% sol. sulph. magnesium.

February 27th, no medication; able to eat off the floor.

February 28th, such a marked improvement discontinued medication.

March 4th, placed in corral where he could take voluntary exercise.

March 14th, returned to duty.

(No other medication used outside of the magnesium sulphate.)

That the experiment may be given further tests so as to prove its worthiness, it is desired to bring it to the attention of other veterinarians.

THE CARE OF THE FEET

CAPT. JOHN H. GOULD
Division Veterinarian, 88th Division, Veterinary Corps

Where horses and mules are allowed to run in corrals that are poorly drained, muddy, not properly cleaned, and polluted with stable refuse, thrush, hoof rot, and even canker of the foot are apt to develop. Animals under these conditions should have their feet cleaned by use of a blunt pointed hoof hook, or other blunt instrument, at least twice each week. If there is discovered any signs of decay in the frog or other part of the foot, the whole plantar surface should be treated with an application of pine tar. The tar should be tucked into the bottoms of all crevices, and, if such crevices are deep in the middle or lateral commissures of the frog, a small pledget of oakum should be tamped in over it as an additional protection and to assist in retaining the tar.

Frayed portions of horny frog and loose scales of sole should be removed, as they harbor filth and dirt. If the foot is unduly large, by reason of lack of care in trimming, the excess horn should be removed and the foot should be properly leveled.

In cases where the cracks and crevices in the frog are deep and cause lameness, equal parts of pine tar, oil of tar and turpentine may be used to advantage.

Great care should be exercised in keeping corrals and stables free from stable refuse and mud holes, but barring the possibility of such a perfect condition of corrals and stables, the feet of all horses and mules should be regularly cleaned out in order that any deviation from the normal may be determined before it reaches the stage whereby it becomes serious enough to incapacitate the animal for duty.

From past experience with large numbers of animals, I should predict that unless unusual care is taken to guard against the con-

dition mentioned, that there will be a great number of animals in our cantonments and remount stations affected with thrush in varying degrees of intensity. And this more particularly as the frequent freezing and thawing attendant to the variable weather of the spring months approaches, preventing to a great extent the thorough cleaning of the corrals, open sheds and stables.

ABSTRACTS FROM RECENT LITERATURE

Poll Evil. Capt. J. A. Mathison. *Veterinary Journal.*—The concise record of a number of cases of poll evil that came under his observation and which proved interesting by the different conditions of the parts met with in the disease.

Three cases were due to parts of the occipital bone being loose and driven in the tissues of the poll. Removal of these pieces and efficient drainage was followed with recovery in 24-35 and 59 days.

In another case a piece of shrapnel was found lodged in the occipital region.

In two cases resection of the ligamentum nuchae was resorted to and demanded 12 and 23 days for recovery.

In seven cases, where the ligament had remained healthy but where the pus had burrowed underneath, recovery varied between 12 and 102 days in the hospital.

In two cases the abscesses were superficial to the ligament and recovered in 10 and 32 days.

In nine cases resection of the ligament was performed and diseased portion removed. These remained under treatment between 46 and 65 days.

Of the whole number treated, 17 were geldings, and the balance mares. A. L.

Tubercular Arthritis of the Cervical Vertebrae. Lieut. W. G. Burndred, A.V.C.—A very old Australian mare was suffering with stiffness and was unable to pick up food from the ground. No history of her case could be obtained. One day it was noticed that she was unable to lower her head to drink water from a stream. When examined she was found with impairment of motion in the neck, in the region of the 6th and 7th cervical vertebrae. She manifested pain on pressure of the region or when forced motion was

executed. The mare was placed under observation. Tuberculined she showed manifest reaction. Mallein test was negative. Destroyed, after the diagnosis of tuberculosis was made, she only showed the articular surfaces of the 2d, 3d, 4th, 5th and 6th cervical vertebrae with their articular surfaces studded with small gelatinous nodules of the size of pin's head. Those between the 6th and 7th vertebrae were covered one-half with similar nodules, larger in size, the other part being adherent and covered with granulations. No tubercles were found in any of the organs of the body. The lesions of the articular surfaces were primary lesions of tuberculous condition of the articular surfaces. A. L.

GOITER IN A DOG. Horace Roberts, F.R.C.V.S. *Veterinary Journal.*—A fox terrier had two large swellings on the upper part of the neck. They interfered with his breathing. The dog was of a very nervous nature. An operation was not likely to be accepted on account of a previous fatal result obtained on this dog's mother. Internal administration of thyroid gland was suggested. One tabloid of one grain which contains not less than 0.05 per cent of iodine was given every evening for three hundred consecutive evenings. After this long treatment the goiter was found quite normal, the respiration was natural, there was no more cardiac impulse and on stethoscopic examination of the heart, there was found a regular function. A. L.

NECROTIC VAGINITIS IN CATTLE. G. Mayall, M.R.C.V.S. *Veterinary Journal.*—Three cases are recorded by the author. One lived five days and died. A second lived a week and died. The third lived ten days and recovered. The treatment consisted in the removal of the cleansing, injections and swabbings of the vagina with a solution of mercury iodide and mercuric chloride bougies were inserted. Internal antiseptics were given in linseed tea. The author remarks that there seems to be an intimate connection between this complaint and the retention of the afterbirth, and he believes that the disease is a necrotic one as seems to be considered by some authors. A. L.

NOTES ON THE TREATMENT OF MANGE. Vétérinaire Aide-Major Chatelain, 1st Class. *Recueil Médecine Vétérinaire,* January 15th, 1918. (Translated by Major L. A. Merillat, Veterinary Hospital, A. P. O. 731.)—Of all the ailments that hinder the effectiveness

of a campaign, mange is the most tenacious and widespread, presenting difficulties both as regards the cure of the affected animals and the administration of remedial measures.

Nearly all of the remedies recognized or employed by veterinarians bring good results. Some are rapid and some are slow but all of them cure well enough.

The rapidity of the cure varies according to the pains taken in administering the treatment and the best results, as in all medication, all things being equal, occur when the practitioner applies the treatment himself.

These things being agreed the points to be considered in the treatment of mange in an army in the field are: 1st, the rapidity of application; 2nd, the curative effects of the remedy; and 3rd, the cost.

First—The Rapidity of Application. Not only the time required in treating the diseased skin must be considered but also the preparatory treatment such as clipping, because all the remedies that have a fatty base require clipping before being applied. Clipping in a campaign presents great difficulties. There is usually only one clipper in a unit and since the clipping of a horse is a long tiresome job, especially when affected with mange, the affected subjects and suspects cannot be treated as rapidly as they should be. Then again the fatty substances are difficult to spread in winter when hardened by cold, and the time required for the men to wash their hands and that consumed in washing the cured animals must also be computed. Furthermore the price of soap and pomades still further show the disadvantages of such treatment. Price and time are important factors in a campaign, where it is always essential to work fast to check the spread of the disease.

For these reasons those remedies which do not contain fatty bases should be preferred because (except in horses with heavy coats) the therapeutic treatment can be administered without clipping, so that the treatment of a large number of horses can be done in a short time. Rapidity of treatment is therefore also an important factor.

Second—Therapeutic Effect of the Remedy. In a general way it might be said that the effects of medicaments are analogous. Some are perhaps more active than others, but always the enthusiasm with which they are administered manifestly influences the results. Most all veterinarians have had good results with reme-

dies which, when handed to others to administer, have been less effectual. It is therefore futile, in the interest of the sick, to recommend a new remedy if it will not be enthusiastically administered. The author has kept in mind the need of improvising practical formulae. Because of the difficulty of getting supplies one formula must often be substituted for another.

THIRD. As stated above pomades are effectual but they have three disadvantages: (a) the necessity of clipping; (b) very careful application and subsequent care; and (c) the expense.

It is therefore preferable to substitute products and compositions other than those which have appeared in the professional journals. A rational and effectual remedy that has given excellent results both economically and therapeutically is the sulphur bath given by means of the dipping vat, but to make this treatment satisfactory in war it would be necessary to build veterinary hospitals with dipping vats within 20 kilometers of the front in order that all animals affected could be treated.

In lieu of the dipping vat, and when it becomes necessary to meet the emergency of treating an animal in the field showing suspicious depilations I conceived a succedaneum that has given happy results, consisting of cresyl, soap, polysulphure, carbonate of potash and carbonate of sodium. When these are mixed promiscuously they generally cause an insoluble and inert precipitate. The following plan of dispensing removes this obstacle. These formulae, in addition to giving rapid and excellent results, yield a homogeneous emulsion. When allowed to stand it separates into two layers: a green, moss colored one below that is opaque and an orange colored one above that is transparent. It has a powerful therapeutic effect and can be used as well by the practitioner as in war. It is indispensable to always shake the mixture well before using.

PREPARATION. Solution C. Cresyl, 250 gm; hot water, 1000 gm.

Solution D. Polysulphate, 100 gm; hot water, 1000 gm.

Solution A. Potassium carbonate, 40 gm; sodium carbonate, 10 gm; hot water, 1000 gm.

Solution B. White soap, 40 gm; hot water, 1000 gm.

Take one part of Solution A and add one part of Solution B and shake violently; add one part of Solution C and shake again, then add one part of Solution D and shake violently for several moments.

METHOD OF APPLICATION. Wash the horse all over with a wisp of hay and water, and when wet incorporate in the wisp 15 grams of black soap and rub it in briskly all over the body to make the soap lather penetrate to the skin. Let the lather dry a quarter of an hour and then wash off the soap. Now without drying the horse rub the solution into the coat with gentle friction and let it remain for two days and then wash well with white soap.

(Dose: 100 grams for a horse affected all over the body.)

RESULTS. In benign cases one application and in bad cases two to three applications suffice to cure animals affected all over the body, providing they have not been treated with remedies of an irritating nature which have burned the skin and caused the formation of crusts. Immediately after the first application a pronounced amelioration is noticed.

Of the 54 horses treated in this manner all but two were cured promptly.

This treatment is effectual and exceedingly practical where better methods, such as dipping and sulphuration, are not possible to carry out. The word polysulphate is a word used to designate a product entering into nearly all mange remedies that is chemically a pentsulphate of potassium. L. A. M.

A NOTE REGARDING MYIASIS, ESPECIALLY THAT DUE TO SYRPHID LARVAE. Maurice C. Hall. *Arch. Int. Med.*, v. 21 (3), March, pp. 309-312.—This paper records an additional case of myiasis due to rat-tailed larvae in man and summarizes the cases to date. There appear to be at least 17 records claiming the presence of syrphid larvae in the digestive tract of man, one record claiming their presence in the nostrils of man, and two records claiming their presence in the diseased vagina of cattle. The case of rat-tailed larvae in the vagina of a cow, published by Bruce in the *Journal of the A. V. M. A.* for October, 1917, is the second case of the sort, the first case having been published by Hall and Muir in the *Archives of Internal Medicine* in February, 1913. There is a note regarding the occurrence of live rat-tailed larvae in February in Colorado at an altitude of 9,000 feet. M. C. HALL.

EXPERIMENTS ON THE TREATMENT OF RINDERPEST WITH VARIOUS DRUGS. William Hutchins Boynton. *The Philippine Agricultural Review*, Vol. X, No. 3, 1917.—So called cures for rinderpest have been found lacking in curative power. Highly suscepti-

ble animals were used in all the experiments. A highly virulent strain of virus was used to inject the animals upon which the drugs were tried. In the localities where cures for rinderpest had been reported the recoveries of animals without such medication were very high.

Twenty different drugs were used. An 0.85 per cent solution of sodium chloride, warmed to about 41°C. was used to dilute the drugs for intravenous and intraperitoneal injection whenever the dilution was necessary.

Strychnine, nitroglycerin, and echinacoid stimulate animals passing through immunization by the simultaneous method. These drugs are practically useless against rinderpest contracted in the usual way. Only two animals out of a total of over fifty recovered from the disease when treated with the various drugs. The drugs had no curative power for the animals suffering from rinderpest.

HAYDEN.

ACUTE ARTICULAR RHEUMATISM IN THE HORSE—RHEUMATIC FEVER. V. S. *Veterinary Journal.*—A seven-year-old big Shire gelding was taken lame suddenly and grew worse rapidly with considerable swelling from the hock down to the fetlock. His temperature went up to 106°, his pulse was 60, the conjunctiva was injected and the urine slightly colored. Diagnosis was made of acute rheumatic fever with endocarditis. Submitted to alkalines, salicylate and digitalis. The horse was put in slings but his condition grew worse and though its temperature went down a state of collapse set in and he was destroyed. At the post mortem there was found acute synovitis of the fetlock with furrows on the articular cartilage, erosion on that and on the os suffraginis and the sesamoids. The heart had a boiled and streaky look with commencing vegetations of the endocardium of the left auricle just above the insertion of the mitral valve. A. L.

TWO CASES OF TETANUS. Ernest Morgan, M.R.C.V.S. *Veterinary News.*—A brief record of a well bred mare, cast from the army, which had run away a fortnight before and sustained some cuts about the legs. The symptoms were well marked although she could take enough food to keep her alive. Chloral in four dram doses given daily twice a day brought her to an uninterrupted recovery, although she had been kept in a loose box with open windows in a slaughter house where daily killing was carried on.

The other case was not so fortunate. An eight-year-old bay mare had no perceptible wound and yet showed marked tetanic symptoms. On the 3rd day she had swellings between the fore legs and under the chest. On the 6th day had a strong jugular pulse. She could lay down frequently and rise without difficulty. She ate slowly and practically she seemed to improve but finally she got down and was killed. At the post mortem a decolorized clot extending into the arteries was found with also an extensive valvular disease of the heart. A. L.

ARMY VETERINARY SERVICE

THE ARMY VETERINARY SERVICE

MAJOR RAINEY, British Army Veterinary Service

The present work and organization of the Army Veterinary Service afford a striking instance of what can be achieved in a short while when science is adequately assisted by finance and in other ways given facilities fairly completely to develop its latent possibilities. The existing war is the first recorded in military history in which the veterinary service of the Army has been permitted and assisted to carry out a definite scheme of its own generation, and it is this fact which gives most interest to a critical examination of results as they stand today.

The British nation has been blamed by other nations and by its own citizens for its disregard, in the past, of science, but the Royal Army Medical Corps and the Army Veterinary Corps of the present constitute a powerful argument for those defenders of British sanity who maintain its capacity to adapt to practical needs ideas which other, possibly more imaginative, nations have visualized more fully, but have not always in the last resort so completely developed. The old English proverb, "Sharp's a good dog but Holdfast's a better", may perhaps be taken to express this national characteristic.

Primarily, an Army Veterinary Corps must justify its cost on economic grounds. The humanitarian factor, although it plays an important part in the practical work of the corps, cannot for purposes of war on a modern scale be held alone to justify the cost of

so extensive an undertaking as the Army Veterinary Corps of the British Army of today.

It is not possible at this stage to draw up a balance sheet that would accurately or even approximately show what dividend the Nation derives from its capital outlay in this respect, but the following figures present, it is thought, a fair *prima facie* case in favor of an Army Veterinary Service as an economic factor in war:

(a) The total wastage* among horses and mules of the British forces at home and expeditionary forces abroad, including losses from enemy gunfire and all other causes whatsoever, during the year ending December 31st, 1916, amounted to 18% of the total animal strength.

(b) The total wastage among horses and mules of the British forces during the year 1912 (i. e., during peace) amounted approximately to 14.80% of the total animal strength.

These figures mean that in spite of continuous losses from enemy gunfire, and from the inevitable chances and vicissitudes of war, the annual wastage among probably the largest number of horses and mules ever collected together has, during the last complete year of war, actually been less than the rate of wastage in time of peace. This, notwithstanding the fact, bemoaned by humanitarians, that the bulk of the animals have been standing night and day in the open exposed to all weathers, whereas in time of peace all Army animals are stabled under the best hygienic conditions.

The average annual mortality among Army animals participating in the South African War, 1899-1902, exceeded 55% per annum for the whole war.

There was no Army Veterinary Corps in those days. The Army Veterinary Department, as it was then, consisted of only a few officers and Auxiliary Civil Veterinary Surgeons whose duties for all practical purposes were limited to professional attendance upon such sick and wounded animals as chanced to come within their narrow official scope.

Proposals for a better organization, indeed for any adequate organization, were coldly received. The military chiefs of those days, in common more or less with the rest of the community, had little confidence in their veterinary advisers and relied largely

*The expression "wastage" includes deaths, destructions, missing and castings for destruction or sale. The mortality alone in 1916 was 9.47%.

upon the time honored fallacy that all such subsidiary technical matters were of slight, if any, military importance.

Considerations of more legitimate military importance may have led, in 1899-1900, to a Cavalry campaign for which no hay was thought necessary, resulting, for example, in that memorable occasion on which a Brigade of Cavalry marched out from Bloemfontein under 100 strong, the remainder *hors de combat* for the most part from bulk starvation and consequent debility of their horses.

Major W. E. Watson, D.S.O., 6th Dragoon Guards, who marched out with the "Brigade" on that occasion, places the strength of effective mounted men as low as fifty.

It is not, however, claimed that the South African War of 1899-1902 and the present European War are exactly parallel cases in a veterinary point of view. It is not necessary to make such a claim since there is a wide enough margin between an annual equine mortality of 9.47% and 55% to permit of considerable departure from the parallel, without affecting the validity of a statement that on the whole the better results of the present war in equine matters are chiefly attributable to the work of the Army Veterinary Service.

If the South African War was one of marching and countermarching, then this war has been one of hauling and straining to drag vehicles and guns of all descriptions through tenacious mud, under conditions of the greatest hardship and discomfort. Moreover, although there has been little of cavalry work in France, Egypt has afforded opportunity for some extensive operations in this respect, and, in the fighting against Bulgaria during 1916 very heavy work was required of the pack-transport animals. Statistical returns for the German South West African Campaign and Rebellion, August, 1914, to July, 1915, and for the subsequent period, July, 1915, to March 1st, 1916, show an annual mortality at the rate of 9.09% among animals (horses and mules) of the Union forces.

The conditions of this campaign were similar in most respects to those of the South African War, 1899-1902, with this considerable difference that the Union Government were careful to include in their forces an Army Veterinary Corps, identical as far as possible in its organization and proportionate strength with the Army Veterinary Corps of the Imperial Army.

There are thus three distinct figures from which deductions can be made:

1. Those of South African War, 1899-1902, with an annual mortality of 55%.

2. Those of German South West Africa, 1914-1915, annual mortality of 9.09%.

3. Those of the European War, 1914-15-16, inclusive of campaigns in France, Egypt and Salonika—annual mortality under 10%.

If it may be permitted to indulge in a little loose algebraic discussion, then:

Let 'A' be taken to mean an Army at war.
Let 'B' be taken to mean an efficient Army Veterinary Corps.
Let 'C' be taken to mean the peculiar conditions of a South African War.

A+B—C = an annual equine mortality of 9.47%.
A+B+C = an annual equine mortality of 9.09%.
A—B+C = an annual equine mortality of 55%.

The above very simple equations certainly appear to indicate that plus B, otherwise an efficient Army Veterinary Corps, bears an important relation to mortality among Army animals in war.

It is true of course that there is an economic limit to the dimensions and utility of an Army Veterinary Service or of any other administrative service, but that point does not seem yet to have been worked out by calculations. It would appear to be important actuarially to establish precisely what proportion expenditure on each administrative service should bear to the cost of an Army or other National undertaking as a whole, so as to be productive in the long run of the best economic results.

This is a field of scientific inquiry, so far as military operations are concerned, in which little or nothing has been accomplished. At the beginning of the war there were published in the daily newspapers letters from ill-informed and distressed humanitarians in which statements were made to the effect that an Army horse lasted only for a few days after arrival at the front. How unnecessarily these good people distressed themselves and a sympathetic public may be deduced from the above announced annual death-rate which, it is believed, gives the war horse five years' expectation of life after being posted to the British expeditionary force.

The officers of the Army Veterinary Corps are graduates of British and Colonial veterinary colleges, with the exception of

Quartermasters appointed for duty as such to Veterinary Hospitals, Horse Convalescent Depots, Base Depots of Veterinary Stores and Schools of Farriery.

As there exists a good deal of misconception among the general public concerning the degree of professional education required for purposes of graduation as a duly qualified Veterinary Surgeon, it may here be stated that the curriculum of a modern veterinary college extends over four years, that is one year less than the period required for graduation as a practitioner of human medicine and surgery. The curriculum embraces the same subjects as those of the medical student modified or extended where necessary to meet the different requirements of the domesticated animals. It is estimated that about 40% of the entire veterinary profession of this country are now employed as officers in various capacities with the Army Veterinary Corps. The numbers of officers and other ranks, A.V.C., available for duty on mobilization in August, 1914, were: Officers, 109; other ranks, 322, including reservists. Today there are over 1200 officers and considerably more than 20,000 N.C. Os. and men, exclusive of native Indian and Egyptian subordinate personnel. The personnel of the Army Veterinary Corps is, therefore, like that of other branches of the service, chiefly composed of officers and men who have joined the colors since the outbreak of war. No man passed fit for service with front line combatant units has been accepted for enlistment in the Army Veterinary Corps (Regulars) since September, 1915, and of those enlisted prior to that time nearly 3,000 have been transferred to R.N. and B.F.A. and replaced by Class B recruits. As far as possible men accustomed to horses were enlisted, but this source of supply proved to be limited in view of the prior claims of combatant arms, so that it has been necessary to train *ab initio* what appeared most unlikely material. Fortunately the material proved better than official fears. What was lacking in experience was found fruitful in intelligence, and the impression has been gained that for instruction in scientific principles it is as well to have intelligent virgin soil as painfully to have to modify the little knowledge that in veterinary matters especially "is a dangerous thing".

The present personnel as a whole is keen, enthusiastic, and imbued with those ideas of humanitarianism and helpfulness which are essential to useful work among dumb and comparatively stupid animals.

The work of the Army Veterinary Service comprises:

1. The examination for soundness of all animals prior to their purchase for the Army.

2. Care of remounts on board ship.

3. Prevention and control of contagious and other diseases among all Army animals.

4. Treatment of minor cases of sickness and injury under regimental arrangement with the unit to which the animals belong.

5. Evacuation to veterinary hospitals of all cases of sickness or injury that cannot be treated properly with the unit, or that, for military reasons, it is not desirable to retain with the unit.

6. Maintenance of an efficient standard of horse-shoeing throughout the Army.

7. Supply of veterinary medicines and equipment.

8. The training in schools of farriery of shoeing-smiths and cold-shoers required for the Army.

9. Careful observance of and advice upon all matters directly or indirectly affecting the welfare of the Army horse, e. g., stable-management, forage and feeding, watering, etc.

The policy of the Army Veterinary Service is well expressed in the adage, "prevention is better than cure". The importance of prevention in military matters is paramount, and herein veterinary medicine diverges widely from human medical practice. This becomes apparent when one remembers that the horse cannot help himself but is entirely dependent upon the observation and foresight of those whose work it is to fend for him.

Veterinary and medical practice run side by side so far as hygiene, sanitation and antisepsis are concerned, but the point of divergence is where the man can report himself "sick" and the horse cannot. This means that if the horse is to be adequately protected he must be inspected at least once daily by someone who is competent to detect incipient symptoms of disease.

It does not require much imagination to realize the enormous amount of work and organization involved in arranging for this service alone in connection with a military horse strength of many hundreds of thousands.

The difficulty in detecting the first symptoms of disease in a horse is considerable and no small degree of experience is necessary before this difficulty can be overcome. This fact is particularly brought home to those concerned in dealing with outbreaks

of equine influenza and pneumonia. In this class of disease, the greatest scourge of the equine race under conditions of domestication, frequently there is in the early stages little or no abnormal symptom apparent to the unskilled observer. A horse to such may appear in good health although at the time a clinical thermometer will register a rise of 5° F. if the temperature of the animal be taken. It is hardly necessary to add that if taken out and worked in this condition, as only too often happens, the animals will subsequently either die or become so seriously ill as to necessitate several weeks of careful treatment.

Remounts, that is, unseasoned horses, are peculiarly liable to this class of disease, so much so that practically every horse undergoes an attack subsequent to purchase and prior to commencing his military training. The Army Veterinary Service took early steps to combat this potential cause of wastage by enforcing the rule that in no case was any remount to be embarked on a ship or transferred from a Remount Depot unless his temperature had been taken and found to be normal not later than the day immediately preceding his journey. This simple measure alone has probably saved the lives of thousands of horses. In addition to the above rule instructions are that when an outbreak of pneumonia or influenza occurs in any unit no horse of the unit is to be worked on any day during the existence of the outbreak unless his temperature has been taken and found normal.

The foregoing technical information is given as an instance of the complexity and far reaching possibilitiies of equine preventive medicine.

Horses on Board Ship. There is no branch of administration in which the Army Veterinary Service has better justified its existence on economic grounds than in connection with the care of and arrangements for horses and mules on board ship.

At the outbreak of war it became evident that a large number of horses and mules would have to be purchased in other countries and brought to England by sea, and the Veterinary Directorate at the War Office undertook to provide veterinary surgeons to take charge of the animals during the voyage to this country. Veterinary surgeons were also sent out with the Purchasing Commission to examine the animals before purchase and to make such arrangements subsequently as would ensure that only healthy animals were placed on board ship for conveyance to this country or

elsewhere as might be required. One veterinary surgeon and a carefully selected lay assistant were allotted to each ship carrying horses or mules.

The appointment of an assistant, in addition to a veterinary surgeon to each ship proved a fortunate arrangement as it was found possible after a year's experience to place many of the assistants in sole charge of the animals, and to withdraw a corresponding number of veterinary surgeons for duty with Divisions of the new armies at a time when the problem of finding sufficient veterinary officers for the latter was acute.

For purposes of convenience both veterinary surgeons and lay assistants, when acting in sole charge of horses on board ship, are described as "conducting officers". These conducting officers have done invaluable work. Many of them have been continuously employed on horse-ships since October, 1914, and have become trained experts of the highest order.

During the first few months of the war the losses on board ship were somewhat heavy, averaging about 3% for a short period. It is now rare to lose 1%. Ship after ship arrives in port after the voyage across the Atlantic with at most one or two animals lost on the voyage and often none. Even on the long sea route from Canada to Mediterranean theatres of war the loss has seldom amounted to 1%. Including the above mentioned heavy losses during the first few months of the war the total average loss on all horses and mules shipped from the beginning of operations to the present date barely exceeds 1%. These excellent results are attributable in part to the pains taken to ensure the animals being in good health when shipped, in part to the expert care bestowed on the animals on board ship, and in part to the improvements on horse-ships that have been carried out during the war as the result of suggestions and recommendations received from conducting officers. A notable improvement in this connection has been the adoption of a system whereby animals are carried free in pens, each pen containing about five horses or mules. Formerly all Army remounts were carried in narrow stalls, each animal having a stall to itself of a maximum width of 2 feet 6 inches.

The pen gives more freedom of movement, better facility for sanitation and ventilation, and even permits an animal, desiring to do so, to lie down for a while.

Incidentally an important economy has been effected in that far less timber is required for constructing pens than stalls.

The foregoing is only one instance of the many problems that have been tackled successfully as the outcome of keen and zealous observation and research on the part of conducting officers.

Conducting duty during this war has naturally not been devoid of stirring and perilous incident. In July, 1915, the S. S. "Anglo-Californian", carrying 925 horses from Canada to England, was attacked off the coast of Ireland by a German submarine. After three hours' shelling and the death of the captain the ship put into Queenstown in a leaky and battered condition. Of the 925 horses on board 26 were killed by shell fire. The remaining 899 were ultimately landed at an English port in good condition owing to the gallant behavior of the civil veterinary surgeon, Mr. F. Neal, who, although he had every opportunity to leave in the ship's boats at the same time as the subordinate staff, remained at his post and tended the horses almost single-handed until the ship was conveyed into port. He also attended the wounded on board during the engagement. In recognition of these services brought to notice by the Admiralty, Mr. Neal was presented, with the approval of the Treasury, with a gold watch suitably inscribed to commemorate the occasion.

The foregoing is but a single instance of numerous acts of heroism and devotion to duty on the part of conducting officers.

The following extract from the diary of a veterinary surgeon who has acted with distinction as conducting officer since October, 1914, will give some idea of the nature and importance of this work:

S. S. MECHANICIAN, 9TH VOYAGE EX MONTREAL, 958 HORSES, AUGUST 10TH, 1915—DAILY REPORT

A. E. BOYER, M.R.C.V.S., Veterinary Surgeon in Charge

On voyage out all decks were thoroughly cleaned and disinfected. The whole of parting boards, floors, ceilings, stanchions, breast boards, etc., after being scrubbed and disinfected were sprayed with 10 per cent solution of creolin previously to being whitewashed. All mangers were scrubbed with caustic soda and disinfected.

Tuesday, August 10th, 1915

Commenced loading at 8:30 a. m. and finished at 1 p. m. 978 horses were sent, and I, in conjunction with Mr. McEcheran, the veterinary surgeon employed by the Remount Commission, rejected 20, consequently we are sailing 20 horses short. The causes of rejection were as follows:

1 injury to foot, old abscess under wall.
1 suspicious of the contagious dermatitis.
2 cases of strangles well developing.
16 cases of temperatures over 102 degrees.

I took on board over 30 with high temperatures, varying from 100 to 102 degrees.

2 p. m.—Tour of whole ship. Several horses very dull. Saw men allotted to sections, and went over same.

8 p. m.—Tour of whole ship. Saw every horse; found several cases, for which I sent salines. Temperatures very bad; there is no wind. Several horses slightly blowing and sweating. Outside temperature, 69 degrees.

1 Tween, 84 degrees	4 Tween, 76 degrees	Horses do not look very promising tonight, but it is due to the heat. Have every port open, all wind scoops out, and all wind sails up. Can do no more, only hope for some wind.
1 Orlop, 80 degrees	5 Tween, 84 degrees	
2 Tween, 80 degrees	6 Tween, 80 degrees	
2 Orlop, 82 degrees	6 Orlop, 80 degrees	
2 Hold, 76 degrees	6 Hold, 80 degrees	
3 Tween, 80 degrees	7 Tween, 82 degrees	
3 Orlop, 82 degrees	7 Orlop, 80 degrees	

Wednesday, August 11th, 1915

3 a. m.—An awful night. Called out by night watchman. Several horses blowing with heat, one a bad case of congestion; had 9 moved to more airy positions.

7 a. m.—Tour of top deck. With one exception all cases doing well. Not a breath of wind. Horses looking very dull.

10 a. m.—Tour of whole ship. Temperatures very high. More horses moved. Saw every horse, very worried with heat; had all parting boards out and started mucking out.

2 p. m.—Another tour of whole ship. Temperatures still high; no wind. Horses all look jaded and weary, and are without exception the most sick and sorry horses I have ever had.

8 p. m.—Tour of whole ship. Saw every horse; moved 5 tonight. Temperatures a trifle better, but still high. If this heat continues shall be sure to have some losses. Am praying for a breeze. Outside 64 degrees.

1 Tween, 76 degrees	4 Tween, 68 degrees	These are a little better than they have been all day; had 84° in one part today. This has been without exception the most worrying day I have ever had. The horses are a poor lot and seem to crack up and start blowing at 80°. Had I not moved them to the top I am sure I should have had 2 or 3 deaths from congestion to record tonight.
1 Orlop, 74 degrees	5 Tween, 78 degrees	
2 Tween, 72 degrees	6 Tween, 74 degrees	
2 Orlop, 74 degrees	6 Orlop, 76 degrees	
2 Hold, 70 degrees	6 Hold, 76 degrees	
3 Tween, 72 degrees	7 Tween, 76 degrees	
3 Orlop, 76 degrees	7 Orlop, 72 degrees	

Thursday, August 12th, 1915—Nice breeze blowing

7 a. m.—Tour of top deck. All cases moved from below doing well and feeding.

10 a. m.—Tour of whole ship. Temperatures little better; saw every horse; discovered Case 11, pneumonia, also Case 10, strangles, abscess on shoulder, opened same; ship being thoroughly mucked out. Other cases doing well.

2 p. m.—Another tour. Saw every horse; all mucking out finished; ship very sweet; temperatures good, horses looking better; have hopes now, but there are a lot showing signs of a febrile condition. Case 11, pneumonia, got temperature down from 106.4 to 105 degrees, panting, slightly easier. Ship in good form.

8 p. m.—Another tour. Saw every horse; ship cool and sweet; discovered Case 13, showing slight pain in feet; had him moved to place where he could lie down; temperature not up, pulse only slightly. All temperatures good tonight. Pneumonia case slightly better, temperature down to 104. Outside, 58 degrees.

1 Tween, 70 degrees	4 Tween, 62 degrees	
1 Orlop, 68 degrees	5 Tween, 70 degrees	Found two ventilators were not trimmed; altered same, and in 15 minutes a drop of 2 degrees.
2 Tween, 66 degrees	6 Tween, 68 degrees	
2 Orlop, 70 degrees	6 Orlop, 64 degrees	
3 Lower Hold, 68 degrees	6 Hold, 74 degrees	
	7 Tween, 70 degrees	
3 Tween, 66 degrees	7 Orlop, 70 degrees	
3 Orlop, 70 degrees		

Friday, August 13th, 1915—Fine day, nice breeze

7 a. m.—Tour of top deck. All feeding and doing well; had Case 5, a poor, miserable black gelding with strangles, boxed off, so that he could feed without being worried by others and receive special diet.

10 a. m.—Tour of whole ship. All cases doing well; ship being mucked out; saw every horse; called to Case 15, colic, gave draught.

2 p. m.—Tour of whole ship. All cases doing well; mucking out all finished; ship sweet and cool; colic case better.

8 p. m.—Tour of whole ship. All cases doing well except laminitis, which is still in pain, all four feet being affected; temperature not bad, and although high, the ship is very sweet. Have great hopes, but shall not relinquish my vigilance. I miss my assistant, who was sent to take a ship from Newport News. Outside, 55 degrees.

1 Tween, 68 degrees	3 Tween, 62 degrees	6 Orlop, 66 degrees
1 Orlop, 67 degrees	3 Orlop, 68 degrees	6 Hold, 70 degrees
2 Tween, 64 degrees	4 Tween, 60 degrees	7 Tween, 68 degrees
2 Orlop, 70 degrees	5 Tween, 70 degrees	7 Orlop, 68 degrees
2 Hold, 66 degrees	6 Tween, 70 degrees	

Saturday, August 14, 1915—Fine day, nice breeze

5 a. m.—Called to Case 16, colic, gave draught.

7 a. m.—Tour of top deck. All doing well; opened strangles abscess, Case 5, very large and putrid, disinfected stall; colic case still in pain, had him moved to top deck.

10 a. m.—Tour of whole ship. All cases except colic doing well; fear it is a case of severe impaction. Saw every horse, opened strangles abscess; Case 6, had stall disinfected; temperatures good, horses looking very well; mucking out done, and ship thoroughly clean; lines disinfected at 11 a. m. Pneumonia case little better, laminitis the same.

2 p. m.—Tour of whole ship. Saw every horse; colic case still in pain, passed catheter and gave enema; all others doing well.

8 p. m.—Tour of whole ship. Colic case little better, had good passage; all horses except pneumonia and laminitis look very well, and I have great hopes; temperatures excellent tonight. Outside, 54 degrees.

1 Tween, 65 degrees	4 Tween, 56 degrees	Arranged with Chief Officer and fixed a wooden air-shoot with a wind sail attached, to run into dead end of No. 6 Hold; it at once brought the temperature down 4 degrees.
1 Orlop, 62 degrees	5 Tween, 63 degrees	
2 Tween, 62 degrees	6 Tween, 62 degrees	
2 Orlop, 64 degrees	6 Orlop, 60 degrees	
2 Hold, 60 degrees	6 Hold, 66 degrees	
3 Tween, 59 degrees	7 Tween, 60 degrees	
3 Orlop, 62 degrees	7 Orlop, 62 degrees	

10 p. m.—Colic case better, horse out of pain and nibbling a little food.

Sunday, August 15, 1915—Fine day, nice breeze

12:15 a. m.—Called to Case 18, colic, gave draught and left instructions.

7 a. m.—Colic case better. Tour of top deck; all doing well.

10 a. m.—Tour of whole ship. All cases doing well; mucking out finished at 10:30; ship very sweet.

2 p. m.—Tour of whole ship. Saw every horse; all decks cool and sweet, all horses looking well; cases doing as well as can be expected.

8 p. m.—Tour of whole ship. Discovered Case 17, influenza, temperature 106.4; gave draught and moved to a better position. Saw every horse; all cases doing well; temperatures very good tonight. Outside, 57 degrees.

1 Tween, 66 degrees	4 Tween, 60 degrees	Considering the outside, these are excellent. Undoubtedly this is the best ship on the transport for keeping ventilated when you have a little breeze.
1 Orlop, 65 degrees	5 Tween, 64 degrees	
2 Tween, 66 degrees	6 Tween, 64 degrees	
2 Orlop, 68 degrees	6 Orlop, 68 degrees	
2 Hold, 66 degrees	6 Hold, 70 degrees	
3 Tween, 68 degrees	7 Tween, 65 degrees	
3 Orlop, 64 degrees	7 Orlop, 66 degrees	

Monday, August 16th, 1915—Wet, but good wind blowing

7 a. m.—Tour of top deck.

10 a. m.—Tour of whole ship. Saw every horse; mucking out done; had several poor weedy horses moved to better positions. Pneumonia case progressing favorably. Laminitis case no worse. Influenza patient's temperature down to 104 degrees. Ship very sweet, and unless something unforeseen occurs, I hope to land every horse.

2 p. m.—Tour of ship. All patients about the same. Wind rather strong, but it is keeping the ship cool, and we have plenty of fresh air in all parts.

8 p. m.—Tour of ship. Saw every horse; all patients progressing. Pneumonia case, temperature lower. Influenza case, temperature 104.6 but is feeding a little. Ship cool and sweet. Temperature good. Called to colic case; gave draught. Outside, 58 degrees.

1 Tween, 64 degrees	4 Tween, 60 degrees	Owing to rough sea on weather side we have had to have the Orlop deck ports closed, but so arranged the wind sails that we kept them cool.
1 Orlop, 64 degrees	5 Tween, 65 degrees	
2 Tween, 63 degrees	6 Tween, 66 degrees	
2 Orlop, 66 degrees	6 Orlop, 69 degrees	
2 Hold, 65 degrees	6 Hold, 70 degrees	
3 Tween, 66 degrees	7 Tween, 66 degrees	
3 Orlop, 66 degrees	7 Orlop, 68 degrees	

Tuesday, August 17th, 1915—Fine day, light breeze

7 a. m.—Tour of top deck. All patients doing well. Regret to say Case 5, strangles, has an abscess forming on the shoulder, otherwise he was doing well.

10 a. m.—Tour of ship. Saw every horse. Discovered two more cases of strangles and one influenza. Patients progressing, although one influenza case causes a little worry. Mucking out finished 10:30. Ship sweet, but wind is dropping.

2 p. m.—Tour of ship. Saw every horse. Wind almost dropped; some holds rather warm, but sweet. Only three cases causing anxiety; others all doing well.

8 p. m.—Another tour. Saw every horse. Ship rather warm, and several horses slightly blowing; had 10 moved to top deck and more airy positions. Gave night foreman list to watch horses, and orders to move them upon the slightest sign of blowing. My cases do not seem quite so well tonight. Am hoping for a wind to spring up. Feel rather anxious tonight. Outside temperature, 62 degrees.

1 Tween, 74 degrees	6 Orlop, 71 degrees	4 Tween, 64 degrees
2 Tween, 72 degrees	7 Tween, 72 degrees	6 Tween, 70 degrees
2 Hold, 70 degrees	1 Orlop, 71 degrees	6 Hold, 73 degrees
3 Orlop, 74 degrees	2 Orlop, 73 degrees	7 Orlop, 72 degrees
5 Tween, 70 degrees	3 Tween, 68 degrees	

Wednesday, August 18th, 1915—Fine day, nice breeze

7 a. m.—Tour of top deck. All horses moved better. All patients, except bad influenza case, doing well.

10 a. m.—Tour of whole ship. Wind getting up; all mucking out done at 10:30. Saw every horse, discovered another bad influenza case, and two more cases of strangles; all looking and doing well, except Case 17, which is causing some anxiety; ship very sweet.

2 p. m.—Tour of ship. Saw every horse; ship nice and cool and sweet; all cases progressing, except 17.

8 p. m.—Tour of whole ship. Saw every horse; all patients seem a little better tonight; temperatures are down, except pneumonia case, which has gone up to 103°, but pulse is good at 60. Nice breeze blowing, and ship very cool and sweet, although I have four patients very bad; with ordinary luck and care I hope to land every horse. We are 745 miles from Avonmouth at noon today. Temperatures good tonight. Oustide, 61 degrees.

1 Tween, 70 degrees	3 Tween, 67 degrees	6 Orlop, 68 degrees
1 Orlop, 68 degrees	3 Orlop, 70 degrees	6 Hold, 70 degrees
2 Tween, 66 degrees	4 Tween, 62 degrees	7 Tween, 68 degrees
2 Orlop, 66 degrees	5 Tween, 65 degrees	7 Orlop, 70 degrees
2 Hold, 66 degrees	6 Tween, 63 degrees	

11 p. m.—Called to Case 28, colic; gave draught and left instructions, only mild case.

Thursday, August 19th, 1915—Fairly strong wind

7 a. m.—Tour of top deck. Last night's colic case better; all horses doing well, except Case 27, causing a little worry.

10 a. m.—Tour of whole ship. Saw every horse; opened three strangles abscess in cases; all patients doing well; Case 17 a little better. All mucking out done by 10:30, and ship cool and sweet.

2 p. m.—Tour of whole ship. Saw every horse; all patients progressing.

8 p. m.—Tour of whole ship. Saw every horse, and although there are one or two cases which cause a little anxiety, I have great hopes of landing every horse. We expect to reach Avonmouth early Saturday morning. Ship very cool and sweet tonight, and not a single horse blowing. Outside, 62 degrees.

1 Tween, 69 degrees	3 Tween, 66 degrees	6 Orlop, 66 degrees
1 Orlop, 65 degrees	3 Orlop, 68 degrees	6 Hold, 70 degrees
2 Tween, 66 degrees	4 Tween, 63 degrees	7 Tween, 68 degrees
2 Orlop, 67 degrees	5 Tween, 64 degrees	7 Orlop, 70 degrees
2 Hold, 66 degrees	6 Tween, 64 degrees	

Friday, August 20th, 1915—Fine day, nice breeze

7 a. m.—Tour of top deck. All patients doing well. Called to Case 30, colic; gave draught; also to Case 34, ditto. Case 27 still worrying.

10 a. m.—Tour of whole ship. Saw every horse. All doing well. Discovered Case 35, an injury to off coronet which is forming a quittor. Mare in much pain; gave draught. Mucking out all finished 10:30, and horses being well groomed. Have great hopes of landing all.

2 p. m.—Tour of whole ship. Wind dropping a little; hope it will spring up again. All doing well.

8 p. m.—Tour of whole ship. Saw every horse. Being in the submarine zone, all orlop ports are closed, and the wind having dropped, these decks are rather warm, but the ship is sweet. Two cases only worrying, 27 and 35. Hope to unload tomorrow. Outside, 62 degrees.

1 Tween, 72 degrees	4 Tween, 66 degrees	These are, I am afraid, going to rise as the wind is still dropping. I have put on extra watchmen with lamps (as we are sailing all lights out tonight), with instructions to move to upper deck any horse showing the least sign of blowing. My cases number 35 all told, tonight.
1 Orlop, 71 degrees	5 Tween, 71 degrees	
2 Tween, 70 degrees	6 Tween, 69 degrees	
2 Orlop, 72 degrees	6 Orlop, 74 degrees	
2 Hold, 69 degrees	6 Hold, 74 degrees	
3 Tween, 70 degrees	7 Tween, 73 degrees	
3 Orlop, 70 degrees	7 Orlop, 74 degrees	

Saturday, August 21st, 1915—Anchored in Walton Bay at 6:30 A. M. to await tide

7 a. m.—Tour of top deck. All patients progressing, and others looking well.

10 a. m.—Tour of whole ship. All patients doing well. Saw every horse. Mucking out done by 10:30; all sails and alleyways disinfected, and mats laid down for unloading. Although I have about five for hospital, I anticipate not losing one. Ship rather warm; breeze very light.

2 p. m.—Have just heard that we are not to unload until tomorrow morning. This disheartens me after working hard with the horses all the voyage and, having the utensils put away and ship thoroughly cleaned, must make arrangements to feed again tonight and tomorrow morning. Ship very warm; no wind.

8 p. m.—Tour of whole ship. Regret to find temperatures are rising; several horses blowing, and in getting one out to take on top deck have been severely kicked on the knee and disabled *pro tem.*; my head foreman has completed my round. As far as I can see no ship has come from the dock, and the authorities could have unloaded us this afternoon had they made an effort. I have five serious cases which may take the wrong turn owing to the heat, and a record spoiled. Have put on extra watchmen with the foreman with instructions to take every horse to the weather deck upon the slightest sign of blowing. Have persuaded the horsemen to

get up at 2:30 a. m. to again muck out and disinfect the ship before going into dock. My knee is very painful, and I hope nothing happens in the night. Am very sick at not being unloaded today. The temperatures are getting bad, there is no wind, and the ship being anchored, makes it worse. Outside, 63 degrees.

1 Tween, 74 degrees	4 Tween, 68 degrees	
1 Orlop, 76 degrees	5 Tween, 80 degrees	
2 Tween, 76 degrees	6 Tween, 77 degrees	
2 Orlop, 76 degrees	6 Orlop, 76 degrees	These I am afraid,
2 Hold, 73 degrees	6 Hold, 77 degrees	will get higher.
3 Tween, 76 degrees	7 Tween, 74 degrees	
3 Orlop, 74 degrees	7 Orlop, 73 degrees	

On the whole, the horses have improved on the voyage, and are far and away in better condition than when I received them, but there are quite a lot weary and showing signs of temperatures, which tonight will not improve. I sincerely hope I shall be able to land them all, not having lost one up to now.

August 22nd, 1915—Ship docked 4:30 A. M.

7 a. m.—Tour of top deck. All doing well. My knee being still painful, my head foreman went all over the ship, and all is in order. The mucking out was finished at 4 a. m.

9 a. m.—Commenced to unload. Landed every horse, obtaining certificate that their condition was very good. Finished at 11:30 a. m.

I attribute the success of this voyage to the fact that the ship was mucked out every day and that special care and attention was paid to the ventilation. I cannot speak too highly of the chief officer, Mr. Dingle, who entered into the ventilation problem with great zeal, and devised many little schemes to get fresh air into bad corners. I am sure without his assistance and cooperation I should never have got through without losing one or two.

This ship is undoubtedly one of the best in this transport business, both as regards facilities for working, appointment and ventilation. The holds and decks are lofty and the alleyways wide.

A. E. Boyer, M.R.C.V.S.

Work of A.V.C. at the Front. The work with Divisions in the front line and field units and elsewhere is largely of a preventive and first-aid nature. In each Division in addition to the Mobile Veterinary Section of which, later, there is a definite number of officers and non-commissioned officers, Army Veterinary Corps, distributed as evenly as possible throughout the fighting units, just as are Medical officers and N.C. Os. of the R.A.M.C. These veterinary officers and N.C. Os. are responsible for carrying out simple first-aid treatment and for deciding what cases are slight enough for "duty and dressing", and what should be handed over to

the Mobile Veterinary Section of the division for evacuation to veterinary hospitals on the lines of communication. They carry out the constant inspections of animals mentioned in the earlier portion of this article as being indispensable to prevention of diseases, both contagious and non-contagious among animals. Relatively the number of bullet and shell casualties among horses and mules is small as compared with similar casualties among officers and men, because the animals are as far as possible kept behind the firing-line.

In a big Cavalry action naturally matters would be different, but this form of warfare on a big scale still is awaited so far as the British forces in this war are concerned. Horses fare better than men in so far as their thicker skin and bulkier tissues offer greater resistance to projectiles and splinters, but worse than men in that economic considerations and mechanical difficulties often render it necessary to destroy horses for wound conditions which at most would maim a man. Open wound dressing is necessarily for the most part practiced in the field. Bandaging is only practicable to a relatively small extent. Under the best conditions it has not on the whole been found a suitable form of dressing for the unclean type of wound met with on active service, and in the case of equines it is most difficult to apply a bandage to any situation other than the lower extremities of the limbs that will not speedily become displaced and thus a positive evil instead of a hypothetical good. Certainly bandaging appeals strongly to the popular imagination. There is an effective cleanly appearance about a freshly bandaged wound which catches the eye of the journalistic artist and, through his efforts, that of the general public.

In point of actual results, however, it has been found better to disregard superficial appearances and to enlist the bactericidal aid of the oxygen of the atmosphere.

What is probably the best form of field dressing for horses discovered up to the present is as follows: Foreign bodies are removed from the wound as far as possible without probing. Shreds of damaged tissues certain to die and decay if left *in situ* are similarly removed with the dressing scissors. The wound is then gently cleansed with antiseptic wool, facilities for downward drainage of discharge are established and the dressing is completed by painting all exposed tissues with tincture of iodine.

It would not be permitted in an article of this kind to state fully how the personnel of the Army Veterinary Corps is disposed throughout a Division; suffice it to say that every animal is able to receive at all times the expert attention of this personnel. No horse is permitted unnecessarily to suffer. If it is evident that he cannot be restored to usefulness within a reasonable period then he is painlessly destroyed on the spot. If his injury or disease is amenable to treatment he is evacuated without delay to a base hospital containing facilities for the most up-to-date and scientific methods of treatment.

The Mobile Veterinary Section is a complete Veterinary Unit, allotted to a Division, corresponding in many ways with a Field Ambulance of the Royal Army Medical Corps. The duty of this unit is principally to collect from fighting formations in its Divisional area all injured, sick and debilitated animals requiring to be sent back to the large veterinary hospitals on the lines of communication. It also acts as a dressing station and undertakes the collection from the base of veterinary medicines and equipment. These stores are then distributed by the section as required to divisional combatant units, a system which has proved far more convenient and expeditious than that in vogue in the earlier stages of the war when each unit in the field received its supplies independently from Base Depots of Veterinary Stores. Approximately half of the personnel of the Mobile Veterinary Section is utilized in the duty of collection of sick and first aid treatment, including injection when necessary of tetanus antitoxin; the other half forms what is known as the Railway Conducting Party. This party is responsible for safe conveyance of the patients from the nearest available railhead to the Veterinary Hospital at the Base and first-aid attendance *en route*. On its return from the base the conducting party brings with it the medicine and equipment required for distribution to Divisional Units, as mentioned above. Not all the patients collected by the Mobile Veterinary Section are sent to the base; when the division is stationary milder cases are retained and treated by the section and ultimately returned cured to units.

Veterinary Hospitals and Convalescent Horse Depots. These are situated on the line of communication and at the various bases of the Expeditionary Forces, in addition to many established in Home Commands.

An overseas veterinary hospital is established to deal at one time with 1250 cases or a greater number, its organization being such as to permit of ready expansion. The personnel allowed for each hospital is sufficient but not extravagant, having in view the important principle that an administrative service should be an economic dividend-paying proposition.

It is interesting to reflect that on mobilization the then diminutive Army Veterinary Corps was sufficiently hard put to it to find skilled subordinate personnel for one veterinary hospital as at present constituted, whereas there are now about thirty such, apart from Camel Hospitals and Convalescent Horse Depots, all staffed with competent highly trained personnel.

Each hospital is subdivided into wards and each ward as far as possible is appropriated to the treatment of a separate class of injury or disease. To the most skilled surgeons is given the care of wound cases; officers who have specialized in microscopic work have charge of the cases of parasitic skin disease and microbic affections. Similarly each non-commissioned officer has definite duties allotted to him according to the capacity he displays for a certain kind of work.

The treatment of parasitic skin disease alone presents an enormous problem. From earliest history parasitic skin disease has ever been the distressing accompaniment of war. Horses, like men, suffer from the depredations of lice but a far worse scourge of the former is in the disease known as mange.

This disease, caused by a microscopical insect parasite which attacks skin and in one species burrows under the surface of the skin gives enormous trouble. The intense irritation that occurs causes the affected horse to lose flesh rapidly unless promptly and efficiently treated. One veterinary hospital with the British Expeditionary Force is practically confined to the treatment of this disease alone. In the earlier stages of the war each case had to be separately treated by hand, involving an enormous amount of labor, but now there are established in many veterinary hospitals specially constructed dipping baths capable of dealing rapidly and easily with any number of patients. The bath is a long trench-like affair, dug into the ground and lined with concreted material, impervious to water. The bath is filled up to a certain height with a solution or mixture of the medicaments found most efficacious in destruction of the mange parasite and kept by means of steam of

precisely that temperature ascertained to be necessary for the best results in the treatment. Matters are so arranged that the horse on plunging into the bath is completely immersed in the solution whence he emerges, having traversed the length of the bath, by upward incline to the dripping pens.

The principal trouble in regard to mange is to find a solution or mixture of medicaments that will destroy the parasite and its eggs without injuring the skin of the patient. Unless care is taken to observe both these conditions injury to the skin to a serious extent may supervene, so that the remedy proves "worse than the disease".

To eradicate mange entirely from an Army in the field has so far proved impossible, but in this war it is kept well under control and has never got the upper hand, as it did in the South African War, 1899-1902, when it caused heavy mortality and inefficiency.

The great progress in methods of treatment of mange made by the Army Veterinary Service in the present war is scientifically gratifying and economically important. It has in fact, as a disease, ceased to be a terror and now only remains a nuisance. In the British Expeditionary Force 80% of all cases of disease, including wounds, admitted to veterinary hospitals are returned to duty in due course. Of the remaining 20% a considerable proportion are painlessly destroyed, and sold at a good price to the local inhabitants for human consumption. In this country the percentage returned to duty from veterinary hospitals is naturally higher in proportion as the conditions obtaining at home are more favorable than those nearer the firing line. The absolute wastage both overseas and at home is thus kept down to a low monetary figure.

Each veterinary hospital is an entirely self-contained unit responsible not only for the treatment of 1250 horses and mules, but for the discipline, training, payment, and general welfare of over 400 non-commissioned officers and men. Apart from medical and surgical treatment the horse and mule patients have to be fed, watered, groomed, shod, exercised and generally cared for in such a way that they will be fit for duty at the front or elsewhere when discharged from hospital. All animals thus discharged for duty are sent straight to remount depots where they are classified and posted again for service to various branches of the Army as may be most suitable.

The selection of adequate sites for veterinary hospitals has been a difficult business. Apart from the large area required, questions of accessibility to railway stations, good water supply, facilities for disposal of manure and carcasses, called for serious consideration. A horse normally needs for drinking purposes alone about 8 gallons of water a day in addition to the requirements for surgical and other purposes. In the opening months of the war the veterinary hospital was necessarily for the most part an open air institution. Not at once could there spring into existence the present admirably constructed stables, operating sheds, shoeing forges, exercising tracks, store houses and other carefully devised arrangements for the convenience and comfort of animals and men.

Although it is true that horses tied up in the open will, if well fed and rugged, and provided with moderately mud-free standings, keep in good health and flesh, it is nevertheless impossible in the climatic conditions of Northern Europe to obtain the best results in these circumstances so far as veterinary hospitals are concerned. Among reasons that contribute to the desirability of some sort of overhead cover for sick horses, there stands out prominently the fact that it is not reasonable, humanly speaking, to expect men to give to patients standing in the open in wet weather the individual care and attention which are essential to successful veterinary work. Moreover, during the winter months, at least, covered accommodation is absolutely necessary for the adequate treatment of mange which, as already stated, forms a constant and considerable proportion of equine patients in time of war. To deal efficiently with this disease it is necessary to clip the animal all over, to wash or "dress" them frequently, and to leave them unrugged during the course of the treatment, as rugs harbor infection and facilitate spread of the malady. It is evident that grave loss of flesh and condition must occur if unclipped and recently "dressed" animals are exposed day and night to wintry weather while tethered and without protection or shelter of any kind. Condition is easily lost but hard and tedious to restore. A really emaciated animal takes many weeks and even months to recover sufficient muscular bulk to fit him for the heavy exertion of military duty at the front. The financial expenditure represented by covered accommodation for veterinary hospitals is therefore repaid in preservation of condition and consequently accelerated

convalescence. In veterinary as in most other matters "time is money", as practically every horse delayed in hospital has to be replaced in the unit whence he comes by a fit horse from a remount depot. Shelter and a moderate amount of warmth are great aids in the restoration of condition as well as in preventing the loss of it. Food has not only to build up the tissues but to maintain the body temperature, and the more is diverted to the latter service the less is available for the former. On a standard minimum food ration, therefore, it is important for body building purposes to keep the patient warm.

Especially during the winter in France and Belgium, when the universal mud throws heavy strain upon gun teams and transport animals by reason of the great difficulty in dragging vehicles over the shell torn swamp-like ground, a constant stream of debilitated and war-worn horses and mules pours into the veterinary hospitals from divisions at the front. These animals for the most part are not diseased but merely weakened through loss of muscular and other tissue. For such horses the comfortable surroundings and shelter of the hospital act like magic. Except in the case of old animals, in a comparatively short period the hollow sides fill out, the coat resumes its normal bloom and the returning strength and spirits give evidence of restored vitality. These results could not be attained in double the time were covered accommodations in winter not available.

Old animals, if debility is at all advanced, recuperate slowly even under the best conditions, so slowly indeed that it is often economically necessary to destroy them rather than to keep them until again fit for work. This lack of resiliency in the old animal renders it most undesirable to purchase for war purposes any horse that has passed the prime of equine life. The period of a horse's life during which he is at his best for military purposes is very brief. If under six years of age he is highly susceptible to all forms of equine contagious disease and stands the hardship of a campaign badly. If over twelve years, although resistant to contagious disease, he has generally lost the elasticity and recuperative powers necessary to enable him to "pick up" quickly after a severe bout of work. Therefore it is that military veterinary hospitals receive an undue proportion of the old horses of an Army especially in the winter months. It would be ungracious to proceed to any description of the buildings of the veterinary hospitals

without referring to the assistance afforded in this respect by the Royal Society for the Prevention of Cruelty to Animals. This admirably organized society has labored throughout the war to assist the Army Veterinary Service in its efforts to promote the welfare of the Army horses and as a logical consequence the efficiency of the armies in the field. Naturally the objective of the society is humanitarianism but the active practice of a genuine, if in a technical point of view irrelevant, good inevitably leads to increased efficiency at some point or other. Benevolent societies like the R. S. P. C. A. and Y. M. C. A., whose objectives at first sight may appear widely removed, are in effect working towards the same end—efficieney. Science, religion, secular benevolence and philosophy, in so far as they are all striving for a positive good are aiming for the same goal, and their progress is only limited by the degree of truth on which their policy and excursions are based.

A crank, that is, an individual who conducts a more or less violent crusade on behalf of a doctrine or belief based on erroneous premises, is more dangerous in his friendship than in his enmity to any of these spheres of useful activity. This reflection brings us back to the wisdom of Solomon and Socrates, who exhorted their generations above all things to "seek wisdom—get understanding".

That country or state which devotes most attention and gives most support to science better described as exact knowledge must, other things being equal, be the most successful in its undertakings whether in peace or war. It is futile in this connection to claim that the demoralization of modern Germany is attributable to overmuch cult of science. The scientists of Germany, like other classes of the Hun community, are harnessed to the Juggernaut of militarism. Those who dictate the high policy of the German Empire are not scientists, but relatively ignorant despots who have employed for evil purposes a force painfully elaborated by the research of scientific men primarily working for the benefit of humanity.

In November, 1914, the Army Council accepted an offer from the society to start a fund for the purpose of hospital requisites for sick and wounded horses, under the title of "The R. S. P. C. A. fund for sick and wounded horses". The Duke of Portland consented to act as chairman of the committee formed, in accordance with the sanction of the War Office, to work in close cooperation with the Army Veterinary Department and supplement the recognized supplies for Army Veterinary Services.

This fund has up to the present collected over 100,000 pounds which has been spent on building veterinary hospitals as required, supplying special horse tents, horse drawn ambulances (for all the veterinary hospitals and for the mobile veterinary sections attached to each division of the British Army) besides presenting motor horse ambulances for the armies themselves. The fund has also provided Bentail corn crushers and chaff-cutters with petrol engines for all the hospitals in France, and has supplied a large number of clipping machines, hand-clippers, dandy brushes, curry combs, Vermorel sprayers, etc., as required.

The first hospital built in 1914 was for 1,000 horses and was constructed of wood and galvanized iron, with wooden mangers and wooden water-troughs. It consists of a series of buildings, each with accommodation for 50 horses and a double expense forage store. It was found that wooden structures required a great deal of repair, and it was also thought that in case of advance or retirement the steel constructed shelters would be more advantageous, as they could be unbolted and removed to some other situation. Therefore, the other three hospitals, built very much on the same plan, but increased to 1250, have been made of steel or cast iron throughout, with roof and centre divisions of corrugated iron. The mangers of the latter are of pressed steel and run down the central divisions, and the stables are fitted with bales. The flooring consists, in the majority of cases, of ashes and railway sleepers, though where it has been possible to make them they have been constructed of cement. Each building has been supplied with a guttering round the eaves and has two drinking troughs, in the majority of cases made of galvanized steel, but latterly these have been replaced by troughs made of reinforced concrete. Each horse has a space of 5½′, length of building 144′, width all over 28′, minimum height 8′, height of ridges 11′. The fund has also provided the hospitals with dining huts, officers' mess, and kitchens with stoves and boilers; also ablution rooms, men's mess rooms with larder, scullery and kitchen, Quartermaster's stores, bath rooms for the men, with douches. Administrative offices, consisting of C. Os.' office, clerk's room, guard room and cells; Quartermaster's office, saddlers' shops, carpenters' shops, pharmacy and stores, drying sheds, dressing sheds and stores (four to each hospital). Sergeants' mess, Sergeants' bathroom, operating sheds and forage and chaff cutting sheds with corn crushers and chaff cutters com-

plete. The fittings for the hospitals have been complete in every detail, including, where it was considered necessary: laboratories for microscopic work, cameras for research work, sterilizers for operating purposes, dressing boxes to contain liniments, bandages, etc., for each ward.

In all cases the fund has provided the complete material and the labor has been found from the Army Veterinary Corps men themselves. This has worked admirably, because after the stables had been erected a certain number of the personnel of each hospital could, for the time being, be employed on constructing buildings under the guidance of Mr. A. H. Fass, who has done splendid honorary work in superintending the erection of the various hospitals given by the fund.

The fund also provided the necessary buildings for 500 horses at No. 1 Convalescent Horse Depot; these buildings are very similar to the ones provided for the hospitals, and they have recently been added to increase the accommodation to 750 horses. In all, hospital accommodation—including stabling for 500 horses at the isolation hospital, Woolwich—for nine thousand five hundred horses have been presented through this fund.

It should be pointed out that the advantage of accepting such voluntary aid is that the work can be carried out under the guidance of the Works Department, but without adding to or hampering that department at a time when it is already overwhelmed with work; therefore, the important question of accommodation for sick and wounded horses can be dealt with immediately, and does not have to wait its turn with all the other work which has to be seen to.

Another supply from the fund which has been of great use to the corps, is that of "Vermorel" sprayers, seventy-eight of which have been issued to all the hospitals and mobile veterinary sections. These are not only of great utility for dressing and cleansing wounds, but also for disinfecting railway trucks in which the horses have been brought railhead, thus preventing the possibility of spreading contagious diseases.

The fund has also presented motor-lorries for conveying fodder and other supplies to certain of the hospitals, and it is by these various aids that the utility of the fund has been established. To the Chief Secretary of the R. S. P. C. A., Hon. Captain E. G. Fairholme, the Army Veterinary Service is greatly indebted for the

enthusiastic and efficient way in which he has organized and co-ordinated the work of the fund so as to adapt its resources with a minimum of waste or friction to the immediate needs of the service.

What has been described in detail concerning veterinary hospitals and the assistance of the R. S. P. C. A. applies chiefly to the hospitals of the British Expeditionary Forces, but the guiding principles of the military veterinary hospitals are the same in commands at home and in the expeditionary forces.

The detail is modified to meet local requirements. In Egypt, for example, it is neither necessary nor desirable to provide covered accommodation to the same extent as in northern Europe. The hospitals in Egypt, moreover, are manned largely by native Egyptian personnel, thus effecting an important economy and saving in man-power. In addition to the standard veterinary hospitals for horses and mules there are established in Egypt, hospitals for camels, organized on lines similar to the former, and also principally manned by native Egyptian subordinate personnel. There are three of these camel hospitals, each established to deal with 1250 camels. The veterinary service in Egypt includes in its organization a mobile veterinary section (apart from the usual divisional mobile veterinary section), having a roving commission. It was found necessary to provide this special unit on account of the widely extended disposition of the forces of Egypt and the long journeys occurring in the transit of animals to and from veterinary hospitals.

The veterinary services working with the British forces in German East Africa have had, in addition to normal professional work, to cope with various problems of the most difficult nature. It was considered advisable, in view of the many specific diseases affecting cattle and equines in East Africa, to hand over the conduct of the Army Veterinary Services in that country to the permanent veterinary staff of the British East African Administration. The chief veterinary officer of the staff was appointed to the Army Veterinary Corps, with temporary rank appropriate to the proper discharge of his responsibilities, and with power to nominate for temporary commissions in the Army Veterinary Corps, such veterinary surgeons on his staff as he considered most competent to assist him. The arrangement proved to be a fortunate one, as these officers brought to their military duties a knowledge of the local diseases obtained by years of residence and research work

among live stock in that country. The well equipped veterinary laboratory at Nairobi was placed at the disposal of the Army Veterinary Service, and many problems were worked out therein with results that have been helpful in the difficulties attending the operation of cavalry and transport in regions beset with fly-borne diseases of the most fatal character.

Among other duties the Army Veterinary Corps has to undertake the collection and care of cattle for fresh meat and transport requirements of the forces. These cattle have been kept comparatively free from rinderpest and other local diseases by inoculation with sera prepared in the Nairobi laboratory and by various measures scientifically ascertained to have protective powers. It is not, perhaps, too much to say that a considerable portion of the success attending the operations in German East Africa is fairly attributable to the highly skilled services of the Civil Veterinary Staff, working under the auspices of, and in coördination with the Army Veterinary Service as a whole. The diseases encountered include South African horse-sickness, rinderpest, tsetse-fly diseases, surra, epizootic lymphangitis and anthrax, a sufficiently formidable list to deal with in addition to the normal scourges of war.

Glanders and Mallein. To describe fully the work done during the war by the Army Veterinary Service in connection with the control of glanders alone would require greatly more scope than that of this entire article.

As is now fairly generally known, glanders is a particularly deadly equine disease of insidious nature and is highly infective. Records of this disease date back to Hippocrates and Aristotle, and from earliest history it has caused important losses among horses in times of war. The reasons for its predominance in time of war are partly the same as those which cause most infectious diseases to multiply at such times, but notably a tendency to assume a virulent form when by reason of hardship or food shortage the constitutional bodily resistance of the animal is reduced. An outbreak of glanders occurring in peace among well-fed, highly conditioned otherwise healthy animals spreads slowly and with difficulty, on account of the physiological resistance it encounters; in war, on the other hand, an outbreak occurring among war-worn or debilitated animals will speedily assume most serious proportions unless adequate means are adopted to check it. Fortunately an adequate means now exists in mallein, a substance composed of

killed cultures of the glanders bacillus to which has been added glycerin and carbolic acid.

When mallein is injected by means of a hypodermic syringe under or into the skin of a horse affected with glanders a reaction takes place in which a swelling forms at the site of inoculation and a marked rise of temperature occurs within twenty-four hours. If the horse is not affected with glanders no reaction occurs. As glanders may be dormant in an apparently healthy horse for months, ready to break out in an acute rapidly fatal form at any moment, the value of a means whereby the latent disease can be readily detected becomes easily apparent.

Mallein has been freely used in the present war with the result that the mortality from glanders has been less than 1% of the total mortality from equine disease in general. Every remount is tested with mallein as soon as purchased. Animals arriving from Canada or elsewhere after purchase are again tested. In brief, the test is applied at every period in the animal's career found from past experience to be associated with an outbreak of glanders. Last but not least animals cast and destined to be sold are tested with mallein before sale so as to avoid the possible chance of transferring to the civilian community an infected horse that may develop acute glanders subsequently to sale and thus spread disease to the detriment of national welfare. Naturally all this mallein testing means a great deal of anxious work and drudgery. There are few duties of which the Army veterinary surgeon becomes so heartily sick as this incessant testing of horses with mallein. Nevertheless it has to be done and results show that for the most part it is done skilfully and thoroughly. The operation itself is practically painless, most horses take no notice of it, and there is in a healthy animal no painful sequel such as may occur after vaccination or inoculation for enteric in man.

Formerly all mallein for the purpose of the British Army was obtained from the Royal Veterinary College laboratories in London, but at an early stage of the war it was decided that the Army Veterinary Corps should undertake the preparation of the mallein required and that the laboratory of the Army Veterinary School at Aldershot should be used for this purpose. Accordingly an officer of the Special Reserve of the Army Veterinary Corps, a trained bacteriologist, was appointed to carry out the work and matters proceeded satisfactorily till at the height of its activity

the laboratory was turning out 80,000 doses of mallein a month. This could have been maintained, but an interesting development in the history of mallein lessened the need for the variety of mallein hitherto in use. This development occurred as the result of research by French veterinary surgeons who discovered that a very much smaller quantity of a differently prepared mallein injected into the skin of the eyelid sufficed to give a more delicate and, in the opinion of many operators, a more certain test for glanders. The dose of the original mallein injected under the skin of the neck was from 15 to 20 drops, whereas for the eyelid test with the French mallein about two drops are sufficient. A much finer needle is used for the latter so that the greater sensitiveness to pain of the eyelid is automatically compensated. If an animal is glandered a swelling of the eyelid speedily occurs, after injection, accompanied by a more or less profuse discharge from the eye; no reaction is seen if the animal is healthy. For some time the new mallein was all obtained from French sources, but recently the laboratory of the Army Veterinary School has commenced to prepare it and no difficulty is anticipated in turning out an equally reliable preparation of identical nature.

During the last two years only two cases have occurred in which a cast Army horse or mule has been found to be affected with glanders after transfer by sale to the civillian community, notwithstanding the large numbers of Army animals that have been so disposed of during this period. Perhaps this fact constitutes the best evidence that could be offered of the efficiency of the mallein test and the way in which glanders among Army animals has been controlled by this and other means.

Horse Ambulances. The application of horse ambulances to military purposes has been an interesting and useful feature of the present war. During peace, horse ambulances have for some time past been used by the Army Veterinary Corps in connection with station veterinary hospitals but it is believed that the present war is the first in which they have been taken into the field.

Two chief kinds of horse ambulances are used at present, motor horse ambulances and horse-drawn vehicles. The motor horse ambulance was first used overseas at a busy port where the veterinary hospital was necessarily located on a height some distance from the quay. When dealing with animals sick or injured by some accident on the voyage, it was found that some rapid and

powerful means of transport was desirable to convey the patients with the least possible delay from the ship's side to the veterinary hospital. Help was forthcoming in an officer from the committee of the Home of Rest for horses at Cricklewood acting in conjunction with the R. S. P. C. A. to supply a motor horse ambulance if the Director of Transport at the War Office would agree to allow the motor firm selected to release from combatant requirements a suitable chassis. In due course this permission was obtained, a body constructed to carry at one time two patients was fitted to the chassis, and the ambulance was despatched overseas. Needless to say, it proved a great success.

Since then other motor ambulances have been supplied by the R. S. P. C. A. as required. It has been necessary for military reasons to keep the number within low and definite limits so as not unduly to encroach upon the prior claims of combatant branches of the service and of the R. A. M. C. for chassis and petrol. No such considerations, however, have hindered the adequate supply of horse-drawn vehicles for ambulance purposes, and these are now included in the equipment of all veterinary hospitals and many mobile veterinary sections. Apart from the humanitarian aspect these motor ambulances play an important economic part in facilitating the removal to veterinary hospitals of numbers of horses and mules that would otherwise have to be destroyed. Injuries to the foot bulk largely in the list of troubles to which the war horse is particularly subject. Of this class of injury the principal cause is the extraordinary liability of iron nails lying on the ground to attach themselves to and penetrate the sole and frog of the horse's foot. Most of the material conveyed to the troops overseas is packed in light wooden cases and in the process of opening and ultimately burning these, nails become distributed broadcast. Every possible effort has been made to prevent this distribution, but military exigencies are such that this phenomenon is to a large extent inevitable. The extent of injury to the horse caused by picked-up nail naturally varies according to the degrees of penetration and the amount and nature of infective dirt carried into the wound at the time of, or subsequent to, the accident. Very often the accident causes no obvious lameness at the time and, especially in the presence of mud, the condition may escape observation until, perhaps, one morning the affected animal is found so lame as to be unable to bear any weight on the foot. This occurs by reason of

the rapid formation of pus, resulting from infection of the wound, within the rigid horny capsule of the foot, causing pressure on the sensitive structures within. First-aid is at once administered by paring away the horn over the wound, liberating the pent-up discharge and applying an antiseptic dressing, but the horse remains very lame and unable to walk without much pain and distress. The question of his removal to a railway station for dispatch to hospital is solved by the horse ambulance. In this he travels in comparative ease the distance to the station, and having completed the railway journey, is again conveyed in comfort in an ambulance to the veterinary hospital, where his foot receives more particular attention and he is soon on the high road to a speedy recovery.

The cases of picked-up nail, that is, the cases of injury to the foot of Army horses from this cause, in France alone, number several hundred a week. Attempts are being made to devise a movable metal protection to the sole of the foot that will prevent penetration by nails without being too heavy or difficult to adjust, and it is hoped that in due course a satisfactory outcome of the experience will result. In the meantime the horse ambulance probably justifies its provision and maintenance on account of this item alone.

Army Schools of Farriery. Army horses working on modern macadamized roads have to be shod well and frequently if they are to remain effective and therefore at duty. A set of shoes will often barely suffice a horse in a gun-team for 100 miles of modern road work, i. e., about five days constant but not severe marching.

If an army fights on its belly, it is certain that a horse does all its work on its feet, and for military purposes in western Europe an unshod horse is useless. While the New Armies formed during the first year of war were still "on paper" it was foreseen that unless extraordinary steps were taken there would be a very serious shortage in the Army of men able to shoe horses. Accordingly every possible means was utilized to obtain shoeing-smiths. This was before the days of conscription and in order to get as many as possible of the experienced blacksmiths scattered throughout the country to join the Army, high rates of pay and attractive prospects of promotion were offered. This measure sufficed to relieve immediate needs but it was clear that for future purposes much more comprehensive arrangements would have to be made. The supply of ready-made blacksmiths suitable for the Army was com-

paratively small. The motor-car, by replacing horses for many purposes both in town and country, had hit the art of farriery very hard and the village smithy had for some time fallen off in attractiveness to young men seeking a trade to follow. Obviously, therefore, the thing to do was for the Army to train its own shoeing-smiths, or at any rate to get soldiers trained as shoeing-smiths in some way or other. The question of training was taken up eagerly. Wherever opportunity offered young soldiers volunteering for the work were placed under training in military and civilian forges. Classes of instruction were started in veterinary hospitals, remount depots, etc. The Borough Polytechnic Institute, Bermondsey, gave considerable assistance by organizing large classes of instruction in cold-shoeing at Herold's Institute, Bermondsey. The great demand was for shoeing-smiths for Royal Field Artillery and Infantry Transport. The cavalry were fairly well off, as they were able to train, with the assistance of older farriers called up from the reserve, under regimental conditions, sufficient recruits for their purposes. The Army Service Corps were also well off, as the great majority of blacksmiths coming into the Army from civil life in the early months of the war were enlisted by special arrangement in the A. S. C. Also the A. S. C. were in a position to undertake the training of considerable numbers of cold-shoers and shoeing-smiths in their regimental forges, which were already established at most pre-war military stations in this country. Presently, as might have been expected, it was discovered that a grave lack of uniformity existed in the degree of proficiency displayed by the newly trained men. Some of the new "cold-shoers", as they were officially described, were fairly useful, others proved after trial to have only a superficial and theoretical knowledge of the work. Meanwhile the rapid growth of the New Armies and the necessity for quick replacement of casualties occurring overseas called for an ever increasing number of adequately trained cold-shoers and shoeing-smiths.

Briefly, the difference between a cold-shoer and a shoeing-smith is one of degree, in which the latter has the advantage. The cold-shoer knows enough about shoeing to take off and nail on shoes and carry out what may be described as "minor repairs". The shoeing-smith is a complete artificer able to make a shoe as well as to adapt it to its destined purpose.

In the early summer of 1915 the Army Veterinary Department

of the War Office offered to establish and organize Schools of Farriery, each school to be capable of turning out about 1,000 cold-shoers every three months. This offer was accepted and steps were taken forthwith to form three Army Schools of Farriery in this country. At the same time a small School of Farriery came into being on the lines of communication, British Expeditionary Force, under the auspices of the Veterinary Directorate overseas.

The schools have all been working at high pressure since the winter 1915-16 and have given the utmost satisfaction. The system of instruction and standard of examination are uniform and each pupil must give definite proof of competency before he is "passed out" of the school and becomes entitled to the extra-duty pay earned by qualified artificers. A modern Army School of Farriery is a busy affair. With nearly eighty forges going, each fire serving for the instruction of about half a dozen pupils, a daily shoeing of some hundreds of horses, the school is on a par with other gargantuan institutions arising out of the war. Great ingenuity has been displayed by the instructors in devising means of a dummy or artificial nature to assist in the early stages of tuition. A simple but highly effective apparatus varying in form but similar in principle has been introduced to which the foot from a dead horse can be firmly attached. The apparatus with foot attached can then be manipulated and moved through varying angles in exactly the same way as a blacksmith manipulates a horse's foot and leg in the course of shoeing. The learner thus begins on a dummy of infinite patience and insensitiveness to pain should the former be clumsy in his early efforts to nail on a shoe.

The schools are located in the vicinity of remount depots and large garrisons so that there may be an ample supply of Army horses for purposes of instruction and demonstration. The assistant instructors are largely drawn from retired and re-enlisted Army Farriers. In addition to tuition in the art of shoeing, the pupils go through a short course in first-aid surgery of the horse's foot, so that they may know what to do in case of need arising out of their own inexperience or some fortuitous circumstance beyond their control. Questions on this subject form part of the qualifying examination. About two months' concentrated training at a farriery school enables a man of fair average intelligence and manual dexterity to qualify as a "cold-shoer". Not less than three additional months of training are needed before a pupil is qualified to pass out as a "shoeing-smith".

It is correct to speak of the "Art" of shoeing. A competent farrier must be at least somewhat of an artist to be able after a brief scrutiny of a foot so to shape the glowing iron by a few blows of the hammer as to bring its curves into true accordance with those of a hoof that may and often does present abnormality of outline. A skilled farrier scorns over-precise mensuration. At most he will register the greatest breadth or length of a foot by breaking off to the required length a piece of straw to correspond with such dimension. Subsequently with only this piece of straw, and the image reflected in his trained memory, to guide him he will make a shoe that on being fitted will often be found to require no alteration whatever. The Schools of Farriery cannot produce this degree of excellence after five months of training, but they can and do turn out a very useful artificer whose transition to artist is only a question of native capacity and time. In the achievement of this end the problem of how to supply a hastily collected Army of modern dimensions with a sufficiency of forge-artificers has been satisfactorily solved.

In the course of description of any form of honest endeavor the narrative is apt to take on a highly laudatory tone and thus to convey the impression that, wherever else there is shortcoming, at any rate the subject under review is perfect. If such an impression has been conveyed by the foregoing notes it is fortunately not too late to correct it. The Army Veterinary Service, in common with all other organizations dependent for their success upon the individual efforts of human beings, contains a normal proportion of seekers for the line of least resistance, faint-hearted fighters in the struggle against disease and inefficiency. An Army, like a Nation, gets pretty nearly what it deserves in the way of scientific assistance. The vast possibilities of sanitation and preventive medicine are as yet dimly realized even by veterinary surgeons themselves, much less by those who have not at all considered the matter. The many hundreds of debilitated horses pouring every week into veterinary hospitals could be reduced by one-half, were the personnel of the Army Veterinary Corps and that of other Arms concerned with horse-management universally alive to the prior necessity of prevention as distinct from cure of disease. In the professional tendency, inherent in most practitioners, to devote the mind principally to the "healing art" rather than to the practice and propagation of the principles of horse management, hy-

giene and sanitation, lies no small share of the causes that come between perfection and the Army Veterinary Service of today.

It has not been possible in the scope of this article to go closely into detail; the attempt has been made rather to give a general idea of the objective and routine of the Army Veterinary Service. In connection with the views expressed and the demonstration offered of what can be achieved by assisting and encouraging scientific work it is pathetic to reflect that the chief and original source of veterinary service in this country, the Royal Veterinary College of London, is struggling barely to maintain its existence. The arrival of the modern motor vehicle naturally has caused a great falling off in students whence formerly the college derived the bulk of its income. Unassisted at the present time in any way by the state, its funds, such as they are, depreciated by the war, its benches depleted of students, the college has indeed fallen on evil days.

The Royal Veterinary College of Ireland derives liberal financial assistance from the Department of Agriculture and Technical Instruction, and the Edinburgh Veterinary College is substantially helped by the Scottish Education Department, but the English parent college is left to its own resources.

In comparison with the assistance that is given to medical education and all sorts of technical education it may, in view of the above facts, be fairly stated that the Royal Veterinary College has been sadly neglected. Veterinary surgeons are not wealthy men, they pursue an idealistic rather than a profitable profession and are not, therefore, in a position to enrich by endowments the source of their professional education, as so frequently occurs in the case of the Arts and other learned professions.

The enormous amount of valuable national service performed by veterinary surgeons is for the most part overlooked or hidden away in the corner of some Departmental Blue-Book. Even if Armies pass away and there is no more war, the flocks and the herds of the Empire will always require the assistance of the veterinary profession. A Board of Agriculture or Colonial Administration would be handicapped indeed without its veterinary advisers and executive. Assistance cannot, therefore, be denied to the Royal Veterinary College on the grounds that the motor car has banished forever the national need for expert veterinary surgeons. To meet the argument that the present is no time for incurring further public expenditure it may be stated that the college could be kept

above water by appropriating to its needs the annual emoluments paid from the coffers of the State to any one of many dispensable people holding appointments of doubtful utility but indisputable dignity.

—Captain Ernest W. Hogg, entering the Veterinary Reserve Corps June, 1917, has attained a captaincy and has been assigned as Division Veterinarian at Camp Meade, Md.

—First Lieut. Charles M. Stull has been transferred from Fort Bliss, Texas, to the 1st Cavalry, Douglas, Arizona.

—Dr. Curtice C. Bourland has been transferred from Fort Oglethorpe, Ga., to the 80th Field Artillery, Camp MacArthur, Waco, Texas.

—Lieut. Ivan G. Howe, Camp Greene, Charlotte, N. C., has received a commission as First Lieutenant.

—First Lieut. J. L. Ruble, formerly at Fort D. A. Russell, Wyo., is now at 2d Brig. Headquarters, 15th Cavalry Div., Fort Bliss, Texas.

—Dr. Nelson N. Lefler, formerly of Batavia, N. Y., has received a commission as Lieutenant in the Veterinary Reserve Corps and has been ordered to report at Camp Greenleaf, Fort Oglethorpe, Georgia.

—Second Lieut. J. J. Martin, formerly at Fort Riley, has been transferred to Camp Funston, Kans.

—First. Lieut. A. A. Leibold is with the American Expeditionary Forces, France.

—First Lieut. Julius Stotchik, formerly at Leon Springs, Texas, is now with the 21st Field Artillery, Camp MacArthur, Waco, Texas.

—Majors L. A. Klein and A. L. Mason, who went to France on a special mission last November, have completed their work and returned to Washington.

—Lieut. Charles C. Dobson, formerly of Muncie, Ind., is now at Headquarters 76th Infantry Brigade, Camp Shelby, Miss.

—Lieut. Joseph F. Crosby has been transferred from Camp Sevier, S. C., to Fort Sill, Okla., 1st Field Artillery.

—Lieut. Henry H. Haigh, formerly of Philadelphia, Pa., is now with the American Expeditionary Forces in France.

—Lieut. C. W. Likely, formerly with the 341st Field Artillery, has been recently appointed First Lieutenant and transferred to the Command of the Mobile Veterinary Section, No. 314, at Camp Funston, Kans.

—Dr. M. W. Scott has been transferred from East St. Louis, Ill., to Front Royal, Va., on Influenza Control, with temporary headquarters at Louisville, Ky.

—Captain Ross A. Greenwood, formerly at Camp Meade, is with the American Expeditionary Forces.

—Dr. Ralph B. Stewart has been recently promoted from Second Lieutenant to First Lieutenant and has been transferred from Camp Dodge, Ia., to the 310th Cavalry at Fort Ethan Allen, Vt.

—Lieut. Raymond Lamb, of the British Machine Corps, after three years' service, has won the Military Cross for gallantry at Beersheba, Palestine. Lieut. Lamb is the son of Dr. Percy Lamb, formerly of Colorado.

—Lieut. R. O. Stott has been transferred from Douglas, Arizona, to the Auxiliary Remount Depot, Fort Bliss, Texas.

—Lieut. Harve Frank has been transferred from Chicago, Ill., to El Paso, Texas.

—Lieut. H. E. Torgersen has been transferred from Fort Douglas, Utah, to the Remount Depot at Deming, Texas.

—Major D. H. Udall has been transferred from Fort Oglethorpe, Ga., to Camp Grant, Rockford, Ill., as Division Veterinarian.

—Major E. B. Ackerman and Lieutenants Muldoon and Claris have been transferred from Fort Oglethorpe, Ga., to Camp Lee, Va.

—Liberty Loans Strengthen the Liberty Line.

—Dr. L. H. Wright, assistant professor of physiology and pharmacology in the School of Veterinary Medicine at College Station, Texas, has resigned to accept a position as research worker in the University of Nevada and State Experiment Station at Reno, Nevada.

—Dr. F. Edward Isaacson, formerly Animal Pathologist at the Maryland Agricultural Experiment Station, has accepted a position with the Lederle Antitoxin Laboratories at Pearl River, N. Y.

—Make Your Money Fight.

AMERICAN VETERINARY MEDICAL ASSOCIATION

DR. HILTON ELECTED TO EXECUTIVE BOARD

On Wednesday evening, April 10th, 1918, the post-card ballot which was recently made to select a member of the Executive Board for the First District was counted. The result of the count of the ballots shows that Dr. George Hilton of Ottawa, Ont., Canada, was elected to this position. Those acting as tellers were Drs. J. T. Hernsheim, S. E. Bennett and H. B. Raffensperger, Resident State Secretary for Illinois.

L. Enos Day, Acting Secretary.

THE PHILADELPHIA MEETING

Active preparations for the 55th annual convention of the American Veterinary Medical Association are being made by the local committee of arrangements.

The meeting will cover four days, August 19th to 22nd, and will be held in Philadelphia with headquarters and meetings at the Bellevue-Stratford Hotel.

T. E. Munce, General Chairman of the A. V. M. A. Committees, has appointed sub-committees with the following chairmen:

Finance—H. B. Cox.....Philadelphia
Hotel and Reservation—D. E. Hickman....Philadelphia
Program—C. M. Hoskins.....Philadelphia
Entertainment—Fred Stehle, Jr.....Philadelphia
Ladies' Auxiliary—Mrs. H. B. Cox.....Philadelphia
Transportation—F. H. Schneider.....Philadelphia
Registration—Thomas Kelly.....Philadelphia
Clinic—Wm. J. Lentz.....Philadelphia
Press and Publicity—W. S. Gimper.....Harrisburg
General Chairman—T. E. Munce.....Harrisburg

Meetings of the several committees have been held at which definite plans were formulated indicating that a comprehensive program including new features, in addition to the customary general and joint sessions and section work, will be presented.

Matters pertaining to the activities of the Army Veterinary Corps will be an especially interesting portion of the program. It is expected that the Army Veterinarians will be represented by leading members of the profession from the armies of the Entente Allies in addition to those from our own forces.

The veterinary phase of sanitary police work in the cantonments at home and on the battle fields abroad has suddenly assumed an importance never before accorded it; and it will be interesting to all members of the A. V. M. A. to learn from those directing this work, of the successful efforts made to meet the emergency of rapidly expanding armies.

Every effort will be made to overcome any inconveniences of travel and entertainment that may arise from the war situation and a record breaking attendance at the 55th convention is expected.

W. S. GIMPER.

REDUCED FARES FROM PACIFIC COAST TERRITORY

The question of authorizing special excursion fares from Pacific Coast territory to the East during the coming season was given consideration by the Trans-Continental Lines at a conference held in March and it was decided to refrain from authorizing such fares because the facilities of the railroads are being taxed to the utmost in moving troops, munitions, fuel, food and other essentials. The indications are that demands in that relation will increase rather than decrease.

The action stated does not, however, deprive delegates from the Pacific Coast of reduced fares since they may take advantage of regular nine months excursion fares which are in effect daily from Pacific Coast Common Points—California and North Pacific Coast—to eastern terminals of Trans-Continental Lines. These tickets are sold at a substantial reduction from double the one way fares and are on sale daily. They are limited for return within nine months from date of sale. These excursion fares approximate two cents per mile in each direction and are about one fare and one-third. These excursion tickets are sold only from the States of California, Nevada, Oregon, Washington and British Columbia.

EXPANDING OUR JOURNAL

For some time it has been quite apparent to the writer, at least, that our editor is handling a situation practically unsupported and unaided that is beyond what should be required or expected of any one individual, particularly in face of the fact that he has important duties to perform aside from the publication of the JOURNAL.

It has, speaking in all frankness, been somewhat of a mystery just how our editor has managed under existing conditions to make such a good showing.

In this connection it is suggested that the time is at hand or is fast approaching when our JOURNAL will have to be enlarged and contain a greater variety of matter to meet the requirements and fancies of men following the different specialties presented by veterinary science.

If this be true, it is manifestly obvious that if our editor is at present performing a large task, his burden should not be increased but rather should be lightened.

We have two suggestions to remedy the existing conditions and to prepare for the future: first, that all A. V. M. A. Resident State Secretaries be required to assume among other things the duties of associate editors and that the president, when selecting state secretaries, choose men who have an aptitude, and who are in a position to assist our editor in collecting news and literature that will enable us to make our JOURNAL more attractive and valuable; second, that a business manager be secured whose duty it would be to look after the advertising, printing, subscriptions and other commercial details incidental to the successful publication of a JOURNAL such as ours. R. A. ARCHIBALD.

ASSOCIATION MEETINGS

CONFERENCE ON TICK ERADICATION

The greatest gathering ever held in conference for the advancement of the work of eradicating the cattle fever tick was held in New Orleans, January 15 to 18, at the St. Charles Hotel in their spacious convention hall, the session lasting four days with an attendance of approximately 300 workers and veterinarians from all southern states where the work is still in progress.

The convention hall was profusely decorated with the National emblem. The meeting, being called to order, was opened with singing of the Star Spangled Banner by the assemblage, followed by an address of welcome by the Mayor of New Orleans, the Honorable Martin Behrmann.

Dr. R. A. Ramsey, chief of the B. A. I. tick eradication forces, addressed the conference on "Organization of the Bureau and the

Need of Cooperation Between Its Employees'' in a manner which indelibly impressed its import on the minds of all fortunate enough to be present and obtain the benefits of the doctor's wide range of experience.

The work of eradication of the cattle fever tick from the South has taken a wonderful impetus in its progress in the last few years; Kentucky, California, Missouri, Tennessee and Mississippi have made entering wedges clean through to the Gulf Coast, splitting the solid South from the federal and state quarantine bondage and a greater part of other states have been cleaned, leaving only 48 per cent of the square mileage originally quarantined that yet remains to be worked.

All eyes are on Louisiana this year and Dr. E. I. Smith, Inspector in charge of the Louisiana forces, in a well worded and comforting address, gave the conference ''impromptu'' his field experiences as applied to administrative duties as Inspector in Charge, and the assurance that Louisiana would make a drive this year that would put it Over the Top in eradication of the tick.

The reception accorded Dr. W. H. Dalrymple of Louisiana was synonymous with his national reputation as a veterinarian and an address teeming with originality of thought and masterly in delivery was heard by the assemblage with enthusiastic applause.

All of the southern states were represented by their respective state veterinarians. Dr. C. A. Cary of Alabama was attentively listened to, as the doctor always has something good to divulge. Dr. Peter F. Bahnsen of Georgia, ''the man with the punch'', in true characteristic style brought repeated applause.

Compelling dipping when public sentiment will not mold to voluntary action was the theme of Dr. R. E. Jackson, Inspector in Charge of Alabama, and the doctor knows how to handle this matter to perfection. There being no state-wide tick-eradication law in Alabama, the doctor has shown that he is a past master in the art of injunction, for by his regulation device, cattle can only be moved with his permission out of the counties in his state that are not eradicating the tick. Like Dewey at Manila he has them bottled up until they agree to eradicate.

A missing personality was conspicuous by its absence in that of Dr. J. A. Kiernan, now chief of tuberculosis eradication, who, on former gatherings of the tick eradication forces, wielded the gavel with a vim and vigor that carried the business

along on schedule time. The anonymous question box idea, although introduced with the best of intentions to bring out knotted problems to be untangled by the conference, had a reacting anaesthetizing effect on the assembly; restoratives were applied in the assignment of two old generals in tick eradication work to do picket duty and see that no one lapsed into coma. Doctors Charles Becker of Alabama (sweet under all circumstances) and J. B. Reidy, Inspector in Charge, of Texas, enlivened the dull siege through which we were passing with characteristic stimulations.

The singing of the last stanza of the song "AMERICA", led by Dr. C. Becker, closed the conference "*sine die*". A general handshake and "adieus" were given all around, the meeting declared a huge impetus to the workers in tick eradication to renewed effort and greater confidence; all then left for their various fields of assignment in the new and greater South.

EDWARD HORSTMAN, Veterinary Inspector.

NORTHEASTERN PENNSYLVANIA VETERINARY CLUB

Dr. T. E. Munce, Acting State Veterinarian for Pennsylvania, and Dr. A. E. Wight, U. S. Department of Agriculture, Bureau of Animal Industry, addressed a joint meeting of the Northeastern Pennsylvania Veterinary Club, the Cattle Breeders and County Agents, with reference to the Accredited Herd Movement, at Hotel Sterling, Wilkes-Barre, Pa., on Thursday, March 21st.

Dr. Howard C. Reynolds, of the International Correspondence Schools, Scranton, Pa., acted as chairman. Chas. F. Johnson, Superintendent of the Luzerne County Industrial Home at Kis Lyn, Pa., gave the opening address, setting forth in a brief way the necessity of the breeders, county agents and veterinarians becoming more united in their efforts to fight a common enemy (tuberculosis). Dr. Munce gave a paper on the "Eradication of Bovine Tuberculosis and Accredited Herds", referring to the work that is being done by the State Live Stock Sanitary Board of Pennsylvania in regard to controlling the disease. Dr. Wight outlined the work that the Federal Department is doing with reference to the Accredited Herd Movement. He stated that twenty-seven of the states had already taken up the Accredited Herd Movement and were working in conjunction with the federal authorities in an effort to eradicate the disease in thoroughbred herds. Dr. Henry

W. Turner of Pittsburgh opened the discussion of Dr. Munce's and Dr. Wight's paper, and also referred to his experiments in seven-day retesting. Dr. Weaver of State College, Dr. Brunner of Harrisburg, Dr. Ridge of Somerton, Dr. Church of Wilkes-Barre, Drs. Paget and Helmar of Scranton, and Mr. A. J. Anderson, Editor of the *Pennsylvania Farmer* of Philadelphia, also took an active part in the discussion.

Many of the most representative breeders of registered cattle were present and expressed their willingness to cooperate with the state and federal authorities in carrying out the Accredited Herd Movement. Mr. George Carpenter, one of the most prominent breeders of Guernsey and Holstein cattle in Northeastern Pennsylvania, a man who has had wide experience in the dairy and cattle business, was present and gave a fine talk, bringing out that tuberculosis was one of the most vital things with which the dairymen and breeders had to contend, and also showed his willingness to go along with the state and federal authorities in their effort to control the disease. Mr. Conygham, of the Conyghams Farms at Dallas, Pa., and Mr. Benj. Covey of the Elmview Farms, Elmhurst, Pa., gave very enthusiastic talks and showed a keen interest in the movement. Mr. Engle, County Agent of Susquehanna County, and Mr. Sloan, County Agent of Bradford County, both gave interesting talks. Mr. Sloan extended an urgent invitation, requesting Dr. Munce and Dr. Wight to attend the Bradford County Breeders Association meeting to be held sometime in August.

Those in charge of the meeting were very much pleased with the enthusiasm with which the Accredited Herd Movement was received and feel that the work will progress rapidly as soon as the state and federal authorities have their working forces thoroughly organized.

H. C. Reynolds.

—Liberty Loans Strengthen the Liberty Line.

—Educational and demonstrational work in connection with hog cholera has been inaugurated in the State of Mississippi; Dr. Hugh L. Fry in charge at Jackson, Miss.

—The Tifton Packing Company of Tifton, Ga., has been granted inspection of its products with Dr. James I. Martin in charge.

COMMUNICATION

EMPYEMA OF THE CHEST

Editor Journal of the American Veterinary Medical Association:
Ithaca, N. Y.

In the April number of the JOURNAL there appeared a very interesting and instructive case report by Dr. D. D. LeFevre of Newark, N. Y., entitled "Empyema of the chest and gangrenous necrosis of lungs", which was "read at the 10th Annual Conference for Veterinarians, Ithaca, N. Y., January, 1918".

Dr. LeFevre is to be congratulated upon his methods in handling this case. It is evident that through the employment of heroic measures—measures from which many practitioners would have shrunk—he secured really remarkable results. As intimated in his report, there is a paucity of literature on thoracic surgery in our veterinary text books, and the little that is described is not calculated to cause the practitioner to approach the subject with enthusiasm.

Dr. LeFevre states that "both sides of the chest seemed to be about two-thirds full of some kind of fluid * * * not wishing to run any chance of getting the other side of the chest infected, the canula was immediately withdrawn * * * by percussion it was found that the liquid extended to nearly the same height on both sides of the chest, but it was at a much lower level than formerly. Either the partition between the two halves of the lungs had become ruptured or the liquid from the left side had seeped through the partition into the right side".

Although Dr. LeFevre does not make it quite clear, he no doubt meant, when he said that the fluid "had seeped through the partition", that it passed through the natural openings in the posterior mediastinum about to be mentioned in quoting from Chauveau, Sisson, and Strangeways. Therefore it would not have been necessary for the "partition between the two halves of the lungs" to have "become ruptured" to have brought about the bilateral affection described.

Chauveau: "The posterior mediastinum * * * its inferior part, always deviated to the left, is extremely thin, and perforated by small openings, which give it the appearance of fine lace work."

Sisson, after noting that these apertures are "sometimes absent", makes the following statement: "the character of the pleura here probably explains the clinical observation that in the horse, fluid exudate resulting from unilateral pleurisy is usually present in both pleural sacs in like amount."

Strangeways: "The posterior mediastinum is cribrated inferiorly, several openings leading from one pleural sac to the other. This arrangement is *peculiar to solipeds,* and explains the fact that in these animals there cannot be pleural effusion confined to one side of the chest."

My old "Courtenay", published years ago—which in reality is a compilation of notes on theory and practice delivered to his students for many years by the late Professor Andrew Smith—in discussing hydrothorax in the horse, states that "In cases where copious effusion has taken place, the fluid freely passes from one side of the cavity to the other, there being free communication between the sides, except when closed by bands of lymph".

My only excuse for this communication is that it seems worth while to draw particular attention to the peculiar anatomy of the posterior mediastinum of the horse, and the importance of keeping in mind this peculiarity from a clinical standpoint.

J. P. FOSTER,
Mayo Clinic, Rochester, Minn.

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Ithaca, N. Y.

I have been reading the JOURNAL of recent dates relative to the eating of horses and I have formulated for your JOURNAL the enclosed article which I trust you will feel disposed to print in your next issue, and I think you will unless you have to get Dr. Hoskins' O.K.

With kindest regards, I am

Sincerely yours,
MARK WHITE.

EATING OF HORSES NON-AMERICAN

I have noted the recent advocates of the eating of horses' flesh in the JOURNAL of recent issues, but I, as a veterinarian, native born American, am not in sympathy with this movement and I believe that I voice the sentiment of the majority of veterinarians and Americans.

The eating of horses and dogs is a foreign custom and it will be hard for us Americans to get the consent of our minds to eat our horses, we are too humane and love the horse next to man.

The veterinarian usually is a humanitarian at heart and the best friend of the humane societies, if not he has missed his calling and should not have studied veterinary medicine and is doomed for to fail at his vocation.

We, as veterinarians, should be the last to advocate the killing of our horses for food and the publicity of such in our journals reflects seriously upon us as a profession and will certainly hurt us.

Dr. W. H. Hoskins evidently has an appetite for the steak cut from his old grey mare, but you and I will gladly let him feast alone. We are all aware of the excessive development of Dr. Hoskins' political faculty, but now his stand for Americans eating horses would appear as if he was either boarding at a "Foreign Boardinghouse" or else was seeking publicity at the expense of the veterinary profession.

As evidence of Dr. Hoskins' humanitarian faculty being somewhat atrophied, may be shown by the fact that while I was a student at the University of Pennsylvania, I had occasion to visit Dr. Hoskins' hospital and was shocked to see him advocate and open abscesses with the hot iron and he insisted that this was the most scientific method. This inhuman treatment would explain why he would enjoy horse steak for supper, but I for one will let him eat alone.

In the countries where they eat horses and dogs they are very cruel to these animals.

REVIEW

VETERINARY POST MORTEM TECHNIC

WALTER J. CROCKER, B.S., V.M.D.
Professor of Veterinary Pathology, School of Veterinary Medicine, University of Pennsylvania

8° Cloth, xiv+233 pp., 142 illustrations. J. B. Lippincott Co., Philadelphia and London. $4.00 net.

This attractive volume is a welcome addition to American veterinary literature. It was written as a manual for the use of college students. If I am not mistaken it will prove to be of even greater value to those, no longer in college, who need to refresh their memory or to learn an orderly procedure for making an autopsy.

The titles of the chapters give an idea of the scope of the work. Chapter I, General Considerations; Chapter II, Autopsy Room; Chapter III, Post Mortem Instruments; Chapter IV, External Examination; Chapter V, Internal Examination of the Horse; Chapter VI, Internal Examination of Ruminants; Chapter VII, Internal Examination of Swine; Chapter VIII, Internal Examination of the Dog and Cat; Chapter IX, Internal Examination of the Mouse, Guinea Pig, Rabbit, Fowl and Elephant; Chapter X, Technic and Description of Organs; Chapter XI, Post Mortem Protocol and Report.

In the third chapter nearly sixty different instruments are illustrated and their use described briefly. Everyone will not agree with the author's statement that in autopsy work the tendency to use a butcher knife is to be avoided "since systematic post mortem work is not butchery". The instruments used by those whose business is commercial post mortem work are well adapted for the

purpose for which each is used and they are economical. The price of special post mortem instruments is excessive. In the chapter on the internal examination of the horse directions are given for performing the autopsy with the horse lying on the right side. Other authors give also the method of procedure when the cadaver is lying on its back and when lying on the left side. The statement is made that in cases of digestive disorders the autopsy should be performed with the horse lying on its back so that a possible twist of the intestines might be discovered. I must confess that I have never seen a case where having the horse lying on its back made the slightest difference. By the time an autopsy on a horse is made the intestines are under sufficient pressure to change their position when the abdominal cavity is opened. There might possibly be an occasion when it would be embarrassing not to be able to make an autopsy of a horse lying on the left side. The important thing is to be able to make a systematic autopsy. It is certainly better to know one method than to have a vague impression of two or more.

Clear, detailed directions are given for each step in making an autopsy. The method to be followed in different stages of the autopsy and in opening the several organs after they have been removed from the cadaver is illustrated from photographs of fresh specimens. The book is well illustrated. The paper and print are excellent.

This book is the only one on this subject available to those using the English language. It seems something bordering on the obvious to say it is the best book of its kind procurable. It is much needed and deserves a hearty welcome. S. H. B.

—Make Your Money Fight.

—Dr. R. N. Shaw has removed from Boston to North Amherst, Mass.

—Veterinary Inspector J. S. Oldham has been transferred from Ashland, Ala., to Falfurrias, Texas, for work in tick eradication under Dr. J. B. Reidy, Inspector in Charge.

—Dr. W. A. Curtis, who has been at Iloilo, Philippine Islands, has returned to this country. His address is Chanute, Kans.

—Liberty Loans Strengthen the Liberty Line.

NECROLOGY

ALEXANDRE FRANCOIS LIAUTARD, M.D., V.M.

Alexandre Francois Liautard died at his home, Bois Jerome, France, April 20th, 1918, in his eighty-fourth year.

Born in Paris, February 15th, 1835, Dr. Liautard in his early youth entered the famous veterinary school at Alfort, France, from which institution he graduated in 1856, and after serving three years in the French Army, came to America to practice his profession, and reorganized the New York College of Veterinary Surgeons in New York City, which had been chartered in 1857. At the same time he studied medicine at the University Medical College, in New York City, and received his degree of Doctor of Medicine in 1865.

He was one of the organizers of the United States Veterinary Medical Association, and recorded the first official report of that organization, having been selected to act as secretary at the sessions of that first meeting on June 9th and 10th, 1863, where seven states were represented. It was at this meeting, when this noblest of men and skilled veterinarian, a graduate from a seven-year course veterinary school and at the time a student in medicine, surrounded by the forty men who with him were organizers of our national association, all earnest of purpose, mostly self-made men, and while veterinary practitioners, but few regular graduates, that Dr. Liautard, with the generosity and breadth of character that were his attributes, suggested as the motto of the association, *Non Nobis Solum*—not for us alone—which he afterward adopted as the motto of the American Veterinary College, and which is still the motto of the consolidated schools in New York City today. Another example of his nobility of character and self-sacrifice, was when, in 1913, the American Veterinary Medical Association made him Honorary President on the occasion of its fiftieth anniversary in New York—he being the only living charter member—he denied himself the pleasure of being present to remain at the side of his invalided wife in France.

Dr. Liautard served as president of the United States Veterinary Medical Association from 1875 to '77 and again from 1886 to '87. When the United States Veterinary Medical Association

decided it needed an official organ, Dr. Liautard was selected as its editor; and after some years, when he had made of it an interesting and important organ of the veterinary profession, the association decided to pass it over to him as his own periodical. This step in no way detracted from the value of the *American Veterinary Review* (which he named it) to the association, but on the contrary added to it, and at the same time increased its value to the American veterinary profession in general, which, under Dr. Liautard's editorship, it guided and molded both in and out of the association; and when the *Review* was again taken over by the American Veterinary Medical Association some forty years later, it still found Dr. Liautard the senior editor, and he never ceased to contribute richly to it up to the time of his death.

Dr. Liautard's entire life was devoted to veterinary education. In 1875 he severed his connection with the New York College of Veterinary Surgeons, where he had been Dean, Professor of Anatomy, Operative Surgery, Clinical Director, etc., since 1860, and organized the American Veterinary College, where he filled the same role until the amalgamation of the two schools as a department of New York University in 1899 under the name of the New York-American Veterinary College, when the late Professor William J. Coates became his successor.

In addition to his college work, Dr. Liautard was constantly working in the preparation of text books for the veterinary profession and was the author of a long list of standard works.

As an anatomist and teacher of anatomy he never had an equal. Holding various colored crayons in his left hand, he would stand before a black board and lecture by the hour; at the same time, accurately drawing in colors the subject of his lecture, placing in each part while describing it; and at the completion of his lecture a beautiful colored plate surrounded by the names in white chalk would remain behind him on the board for the students to study. Many of them who had had training in drawing, copied them in their note books. And up to the time of his death, although in his eighty-fourth year, in addition to his activity and keen interest in veterinary education and veterinary matters generally, he followed with close interest the work of the school of which he was the founder.

In 1884 Dr. Liautard was decorated by the French government as *Chevalier du Merite Agricole.*

As founder of the first veterinary school in America and as one of the founders and first secretary of the United States Veterinary Medical Association, he justly merited the title of Father of Veterinary Medicine in America, accorded him by the American veterinary profession.

The principles that he unconsciously instilled into all who came in contact with him, the memories of his nobility of character, the school which he founded, his museum of rare pathological specimens and his library of more than three thousand volumes which have formed the foundation of a library that bears his name in the city of his activities, form a part of the priceless legacy that he has left to the American veterinary profession. Although at an age when his death might have been looked for at any time, the announcement of it comes as a shock from which it is difficult to recover. It is indeed difficult to realize that Alexandre Liautard is dead. His name has been associated with the American veterinary profession and the national organization from the very beginning and during their entire growth and development, and his loss to them will be as sad as it is inestimable; yet, at his age we must not wish to deny him his retirement from the turmoil of the world to the peaceful rest he so well deserves. *Requiescat in pace.*

Dr. Liautard is survived by a loving and devoted daughter, Mrs. Louise M. Boyer.

ROBERT W. ELLIS.

To the editor the death of Dr. Liautard is a great personal loss. From the beginning of our acquaintance after a personal visit eleven years ago, there has been an irregular correspondence which became more intimate when the *American Veterinary Review* was taken over as the official JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION. His interest in the JOURNAL and its success was unlimited. His long life was devoted to unselfish service for the profession he loved. Modest and unassuming, he gave of his best without thought of reward. It is doubtful if the younger generation of our profession realizes in full its profound obligation for the great work he initiated here and the interest he has always maintained in our advancement.

The nobility of his character is evidenced by his active interest in the Franco-Belgian Relief Fund, of which he was one of the

originators, which, with our own Allied Relief Fund, stands as a memorial to his great heart. The sufferings of others and the victims of injustice and oppression aroused in him a responsive thrill of sympathy which translated itself into active relief.

He was one of the great world forces in the veterinary profession. True and loyal to the best ideals with unselfish service, it may well be said of his career in unlimited measure: "Well done, thou good and faithful servant." P. A. F.

JOHN KING

John King, V.S., Carlyle, Saskatchewan, a member of the American Veterinary Medical Association.

ERNEST C. DINGLEY

Dr. Ernest C. Dingley, Philadelphia, Pa., a member of the American Veterinary Medical Association, died November 26, 1917.

BLAIR W. TRUAX

Dr. Blair W. Truax, Burr Oak, Kans., a member of the American Veterinary Medical Association, was killed in an automobile accident.

MISCELLANEOUS

—Veterinary Inspector Robert Thumann has been transferred from Orangeburg, S. C., to Kansas City, Mo.

—The graduating exercises of the Kansas City Veterinary College took place April 23.

—Dr. M. H. Leininger has left Vernon, Ala., and will supervise tick eradication work in three counties with headquarters at Andalusia, Ala.

—Dr. C. A. Klein has removed from Cincinnati, Ohio, to Omaha, Neb., S. S.

—Dr. A. M. Eichelberger will be located at Kipp, Alberta, until next November, where he is interested in a large wheat and live stock ranch. His practice at Shreveport will be conducted by Dr. G. A. Cunningham of New Orleans during his absence. Dr. Frank Collins of Monroe will fill Dr. Eichelberger's place as Secretary of the Louisiana State Board of Veterinary Medical Examiners.

—Dr. T. M. Bayler has removed from Waterloo, Ia., to Bloomington, Ill.

—The next meeting of the Hudson Valley Veterinary Medical Society will be held at Hudson, N. Y., May 1, 1918.

—Dr. John T. Myers has removed to Aurora, Ill., in charge of the government supervision of the plant of the Aurora Serum Company, vice Dr. P. C. Hurley, resigned.

—The work for the control and eradication of hog cholera in the State of Ohio has been placed under the supervision of Dr. Charles H. York, in cooperation with the State Veterinarian. The educational and demonstrational work in Ohio still remains under the supervision of Dr. L. P. Beechy.

—Dr. Joe H. Bux is in charge of educational and demonstrational hog cholera work at Little Rock, Ark., vice Dr. V. W. Knowles, resigned.

—Dr. Harry W. McMaster takes the place of E. B. Jansman, resigned, at the abattoir of the Fesenmeier Packing Company, Huntington, W. Va.

—Dr. Ralph Graham has changed his headquarters from Sedalia, Mo., to Jefferson City, Mo.

—Dr. Lyman B. Dunlop is inspector in charge of federal meat inspection at Salt Lake City, Utah, in place of Dr. Frederick H. Thompson, assigned to tuberculosis eradication with headquarters at St. Paul, Minn.

—Dr. John W. Logan succeeds Dr. B. J. Cady as inspector in charge of educational and demonstrational hog cholera work in the State of California with headquarters at Berkeley, Calif.

—Dr. E. D. Harris, formerly of Casseton, N. D., is now associated with the Florida Live Stock Sanitary Board at Tallahassee, Florida.

—Dr. George R. Teeple has removed from Fort Morgan to Denver, Colo.

—Dr. A. H. Davis has been transferred from Chicago, Ill., to Cheyenne, Wyo., for work upon scabies and dourine.

—Dr. R. W. Gannett of Brooklyn, N. Y., has been appointed to the State Board of Veterinary Examiners, to fill the unexpired term of Dr. W. Reid Blair.

—Dr. F. M. Kearns has sold his practice at Lebanon, Ky., to Dr. R. E. Taylor of Chilton, Ky. Dr. Kearns has removed to Hillsdale, Ind., to engage in farming and stock raising.

—Make Your Money Fight.